

# Report of the Population Panel

*Presented to Parliament by  
the Lord President of the Council  
by Command of Her Majesty  
March 1973*

LONDON  
HER MAJESTY'S STATIONERY OFFICE  
90p net

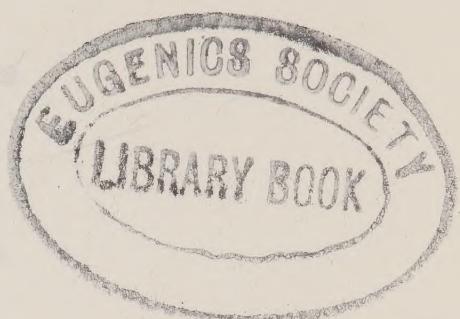
M

13010

58



22102244077



# Report of the Population Panel

*Presented to Parliament by  
the Lord President of the Council  
by Command of Her Majesty  
March 1973*

LONDON  
HER MAJESTY'S STATIONERY OFFICE  
90p net

SBN 10 152580 X

## REPORT OF THE POPULATION PANEL

### MEMBERS

**C. R. Ross**

**M. Abercrombie**

**B. C. Brown**

**A. J. Collier**

**E. Grebenik**

**G. B. Richardson**

**Miss J. H. Thompson**

### SECRETARIES

**Mrs. M. E. Parsons**

**R. E. Crum**

Библиотечный зал № 2000

Библиотека  
С. А. Баранова  
М. А. Абрамова  
Б. Г. Голубев  
А. А. Григорьев  
В. Г. Григорьев  
А. А. Григорьев  
М. А. Григорьев  
М. А. Григорьев

Библиотека  
С. А. Баранова  
М. А. Абрамова  
Б. Г. Голубев

WELLCOME INSTITUTE LIBRARY	
Coll.	wellMomec
Call	
No.	M 13010

## CONTENTS

### FOREWORD

### PART I

	<i>Page</i>
Conclusions and recommendations .....	1

### PART II

#### SUPPORTING ANALYSIS

Chapter 1—The world perspective .....	17
Chapter 2—Population growth in Britain .....	27
Chapter 3—Implications of population growth over the next forty years ..	57
Chapter 4—Britain in the next century .....	93
Chapter 5—Population and policy .....	101

### PART III

#### APPENDICES



## FOREWORD

1. We were appointed in November 1971 by the Lord President of the Council following the Report from the House of Commons Select Committee on Science and Technology on Population of the United Kingdom.<sup>1</sup>
2. The White Paper setting out the observations of the Government<sup>2</sup> on this report stated:

“The question of whether or not the Government should have a population policy or policies is complex and controversial. What is required . . . is an assessment of the available evidence . . .

The Government has decided . . . to appoint a small mixed Panel of experts from outside the Government machine as well as from inside. The members of the Panel will not be experts in the narrow sense, but will have broad and relevant experience in the subject and the necessary qualities to tackle its analysis effectively and dispassionately. The official members will be appointed to the Panel on account of their ability to contribute personally to the analysis of the subject, and not as representatives of Departments.”
3. Our terms of reference were:

“To assess the available evidence about the significance of population growth for both public affairs and private life in this country at present and in prospect: to make recommendations about further work required, and how it should be conducted: and to report within one year.”
4. The requirement to report within one year has obliged us to concentrate on the broad issues. We have not been able to commission any long-term research. Our conclusions and recommendations were submitted in November 1972 followed by a more detailed analysis in February 1973.
5. We have tried to disentangle the different elements in contemporary arguments about population questions. We have not tried to provide definitive answers to all the questions raised. We have explored and mapped out the territory in such a way as to indicate those directions of further enquiry which are likely to be fruitful.
6. We have not looked in detail into the question of environmental pollution because this problem has been referred to a Standing Royal Commission.<sup>3</sup> Nor have we looked at the world situation except insofar as it impinges on Britain.
7. In looking to the future we have concentrated our detailed analysis on the period some 40 years ahead. We have looked more broadly at the period

<sup>1</sup> Session 1970–71 House of Commons Paper 379. See Appendix 1.

<sup>2</sup> Cmnd. 4748 July 1971 (paragraphs 4 and 5).

<sup>3</sup> Royal Commission on Environmental Pollution appointed on 20th February 1970 ‘to advise on matters both national and international, concerning the pollution of the environment, on the adequacy of research in this field; and the future possibilities of danger to the environment.’

## *Foreword*

to the middle of the next century. Such prediction is most hazardous but we have tried to make quantitative projections wherever possible, taking the view that it would be better to provide uncertain and approximate estimates than to give none at all.

8. In deciding our programme our starting point was the Report from the Select Committee.<sup>1</sup> We considered the evidence presented in the Report, and approached those who had submitted evidence to see whether there was anything they wished to add or amend. Paragraph 32 of the Report<sup>2</sup> became a reference point when we were in doubt about the way in which we ought to interpret our terms of reference.

9. We asked Government Departments for their views about the relevance of population trends for their long-term affairs. For this purpose we provided them with three illustrative models of population 15 and 40 years ahead, assuming three different rates of population growth. Their replies helped us to assess the effect of population growth, as distinct from other factors, in a more systematic manner than would otherwise have been possible.

10. We have not taken formal oral evidence but members of the Panel have discussed particular points with experts in many different fields. Appendix 2 lists some of those we have consulted. We have also received letters from many persons and organisations setting out views which they wished us to consider. We are grateful for all the help we have been given, but we must emphasise that we alone are responsible for the conclusions we have reached and the recommendations we have made.

11. We have considered the demographic aspects of population growth in some detail because it seemed important to try to understand precisely what was involved. In places our description may be rather technical. When assessing the significance of population growth we thought it right to consider at length the economic aspects. In other areas, however, value judgements are so important in coming to a conclusion that we tended to sketch more briefly the arguments which emerged from what were frequently lengthy discussions in the Panel. When we consider population policies we have devoted a good deal of space to family planning in order to set out the facts that led us to our recommendation.

12. Part I of our Report contains our conclusions and recommendations and Part II our supporting analysis. We look at the world situation (chapter 1) and then examine population growth in Britain (chapter 2). In chapter 3 we set out the implications of population growth over the next 40 years, while in chapter 4 we look well ahead into the next century. In chapter 5 we examine the role of population policy and look at specific policies, including family planning.

13. We should like to take this opportunity to put on record our thanks to

---

<sup>1</sup> First Report from the Select Committee on Science and Technology Session 1970-71 on Population of the United Kingdom House of Commons Paper 379 May 1971.

<sup>2</sup> See appendix 1.

*Foreword*

the Secretaries of the Panel. From November 1971 to May 1972 the joint-Secretary was Mr. D. W. Wilson who was succeeded by Mrs. M. E. Parsons. Mr. R. E. Crum was joint-Secretary throughout. Without their help and efforts we would not have been able to produce this report.



## PART I

### CONCLUSIONS AND RECOMMENDATIONS

**Submitted to the Lord President of the Council**

*November 1972*



## CONCLUSIONS AND RECOMMENDATIONS

1. We have considered past and future trends in British population, their implications and the problems associated with population policies. In the main we have looked some 40 years ahead, but we have also considered some of the implications of continued population growth thereafter. The results of our analysis and our conclusions and recommendations follow.

2. The discussion is in five parts:

- (i) sets out our conclusions on probable trends in future population and their implications for various areas of concern;
- (ii) looks at the significance of world population growth for Britain;
- (iii) sets out our conclusions and assesses their significance;
- (iv) makes recommendations about the implications of our analysis for Government policy;
- (v) makes recommendations about the organisation which needs to be set up if population trends and their policy implications are in future to be properly analysed on a continuing basis.

### I—Population growth in Britain and its consequences

3. The birth rate has been declining since 1965. But births still exceed deaths and population is still increasing. Britain's population will almost certainly go on rising at least until the end of the century, for two reasons. First the number of women of childbearing age will increase because increasing numbers of girls will be coming into this age group as the years go by. Secondly the average number of children in a family is at present such that over the years births will exceed deaths, and there are reasons for thinking this will continue. In other words the age-structure of the population is itself an almost inevitable cause of further growth, and in addition the average size of completed families is still above replacement level.

4. Birth rates increased in the late 1950s and early 1960s partly because people were marrying younger and having children earlier. The average age at marriage now seems to have stopped falling, and those recently married appear to be having fewer children in the first years of their married lives than was the case 10 years ago. These changes in patterns of marriage and childbearing are sufficient to explain a good deal of the rise and fall in the birth rate in the past 10 or 15 years.

5. As to the future, such evidence as we have suggests that the ultimate family size of the more recently married will probably remain above replacement level. We do not think the average family size is likely to fall to replacement level in the foreseeable future, unless there are marked changes in attitudes or in policies.

6. Experience shows how wrong population projections can be. But however

## *Conclusions and recommendations*

imperfect the projections, policy needs to be based on some view of the future. We have examined the available information about the age distribution of the population and about possible trends in the average size of completed families. After allowing for all the uncertainties, our best guess is that policy should be based on the assumption that the population of Great Britain will increase from a 1971 level of 54 million to about 64 million at some time during the first decade of the next century.

7. Concern has been expressed about the present size of Britain's population and its prospective increase. This concern stems from disquiet about the capacity of the economy to provide for larger numbers; problems of pollution, congestion and noise; health, social tensions, individual stress and alienation; land use; the implications of increased demands on world resources; and Britain's vulnerability to dislocation in the rest of the world.

8. We have considered how the growth of population might affect the growth of our national output. It is obvious that in so far as population growth increases the size of the labour force, total output is also likely to increase. What is more difficult to determine is how population growth might affect productivity, this being taken to mean the level of output per individual worker. After reviewing the various considerations involved we concluded that any probable differences in rates of population growth would be unlikely to have any very significant effect on productivity. This being so, one can say definitely that output per head of the population (as distinct from output per worker) would be lower the faster the rate of growth in numbers, simply because the ratio of working population to total population would be smaller. The differences are unlikely to be large, but there is little doubt about the direction in which they point.

9. So far as claims on output are concerned, a faster rate of increase in population will require more investment to provide the extra productive and social capital needed for larger numbers. Indeed the share of national income required for investment would almost certainly be higher and the share left for private consumption and publicly provided services smaller. This implies that average consumption per head as measured in the national accounts will be lower the faster the rate of population growth. Such projections as we have been able to make suggest that the difference to be expected from different rates of population change would be very small when compared with the substantial increase in both private consumption and public services to be expected from rising productivity over the next 40 years. Moreover the difference in consumption is not an overriding consideration, since people may be prepared to forego minor increases in consumption in order to enjoy the satisfactions of another child in the family.

10. Britain is likely to face serious and deep-seated economic problems over the next 40 years, in particular in adapting its industrial structure to changing patterns of demand and technology. The character and difficulty of these problems is unlikely to be much affected by any probable variations in the rate of population increase.

11. In the absence of serious long-term disruptions in supplies of imported

## *Conclusions and recommendations*

food and raw materials, we do not see overriding difficulties in finding the resources to provide for the greater numbers in prospect over the next 30 to 40 years. Indeed Britain could well become rather more self-sufficient in food production. Water supplies should be sufficient, though the cost of providing water may rise relative to that of other goods.

12. So far as the economic implications of population increase are concerned we see some disadvantages in a faster rather than a slower rate of increase, and no advantage.

13. The general pattern of contemporary life in Britain is that of a dense, highly urbanised society. It is often claimed that the problems associated with such a society would be less acute if the population were smaller. Pollution, urban congestion and the general increase in noise levels are obvious examples. Population pressure has also been cited as one of the major causes of the rise in crime, the increase in suicides and alcoholism, drug addiction and alienation, and the general strain and stress of much of contemporary life.

14. In fact a very large part of environmental pollution and congestion is due to the levels and rates of increase in standards of living and industrial production. All advanced industrialised countries appear to be acutely concerned with such problems irrespective of population size, density or rates of growth. Similarly, in one form or another, problems of stress are acute in most other advanced industrial countries, irrespective of population densities or rates of overall population growth.

15. There is little evidence to suggest that in Britain any of these problems would be significantly less serious if population growth were somewhat lower; or that measures to control the rate of population growth would make a significant contribution to the solution of such problems during the next two or three decades.

16. So far as health is concerned the size and density of the population is only one of many factors determining the physical health of the nation. Patterns of life may have more effect on the spread of epidemics than overall density, or for that matter, urban densities; and while overcrowding may be associated with malnutrition both have a common cause in poverty. Again while different rates of overall population growth may have some effect on the genetic composition of the British population, scientific knowledge is not yet sufficiently advanced to enable the nature of these effects to be sensibly assessed though they are likely to be very slight within one or two generations.

17. Land use and population distribution pose difficult problems for policy. For the foreseeable future, additional demands for urban land and pressure on the countryside are likely to be severe. At present 9% of the total area of Great Britain is devoted to urban use and, on different assumptions about the growth of total population, this could rise to something between 11 and 14% early in the next century. In physical terms there is enough land to house the increased numbers, but increases of this size inevitably means erosion of the agricultural and recreational uses of the countryside. Increasing agricultural

### *Conclusions and recommendations*

productivity should mean that it will be possible to maintain at least the present degree of self-sufficiency using a smaller land area. Leisure and amenity needs can be met in part by developing policies for making much more use of the countryside for recreational purposes.

18. It is the distribution of population, rather than its overall size, that is important in this context. For example, there is concern at population decline in some parts of Scotland and Wales. On the other hand, projections of urban area suggest that the South-East, the Midlands and the North-West will become considerably more urbanised. There are special problems in the North-West where, early in the next century, nearly half the total area might be urbanised and most of the remaining land would be unsuitable for further urban development.

19. For the next two decades at least, pressure on land use is likely to be much more directly caused by rising living standards, as reflected in widespread car-ownership and increasing leisure, rather than by an increase in total numbers. Much will depend too on the extent to which rising living standards lead to demands for lower urban densities. Even if there were no increase in population, urbanisation and pressure on the countryside would still pose very severe problems. Our analysis suggests, however, that in the longer term overall rates of population growth and population distribution are much more important elements in the demands on land and space than in respect of the other problems which we have considered.

20. Population policy is not a panacea for curing the ills of contemporary society. Those who suggest that it is divert attention from these serious problems and the action needed to tackle them. Pressure on the countryside, congestion, social tensions, individual stress and alienation would be serious problems whether Britain's population were 55 million or 70 million, and whether it were stationary or rising.

21. Policies designed to control the rate of increase in population will not be sufficient to deal with the stresses and strains of contemporary society. The effects of such policies would be too slow and too uncertain. There is an urgent need to devise means of tackling these problems: to rely on action which might hypothetically affect the size and rate of increases of population in the longer term is of itself no solution. Having said this, we should emphasise that we do not deny that the rate of population increase exacerbates these problems. Longer-term solutions will be easier to devise and to implement in the context of a stationary rather than an increasing population.

## **II—The significance of world population growth for Britain**

22. World population is over 3,700 million and is expected to double in the next 30 to 40 years, with a faster rate of increase in the developing countries than in the developed countries. The present rate of population growth in the developing countries is unprecedently high creating a completely new situation.

## *Conclusions and recommendations*

23. Some people fear that world resources will soon be insufficient for the needs of the growing world population, and since one person in an affluent country makes heavier demands on world resources than say five persons in a poor country, some have urged that countries such as Britain should reduce their demands on world resources by cutting down their population.

24. Again it is argued that excessive population growth in the world as a whole could lead to a serious breakdown in world trade. On the one hand the increase in population could be so large as to create political and social strains, particularly in the developing countries, on a scale which would lead to some kind of major breakdown in international economic organisation. On the other hand it is also conceivable that the increasing demands of the developing countries for supplies of food and raw materials for their own growth and development may create considerable pressure on the prices of our imports of some essential foods and raw materials.

25. These are serious problems which need much more examination both nationally and internationally. But whatever importance may be attached to the desirability of cutting down our population, we are all agreed that there is no conceivable action which could be taken which would reduce Britain's population within the next 40 years to a level consistent with self-sufficiency. Moreover it is difficult to see how Britain's vulnerability to major changes in the rest of the world would be much affected whether the population was 55 million rather than 70 million.

26. The rate of population growth in developing countries is unlikely to be reduced unless they too succeed in raising their standard of living. It must not be overlooked that these countries are heavily dependent on trade and aid for their progress: a buoyant market for their products is important. It has been urged that the developing countries are less likely to adopt population control programmes for themselves if the richer countries do not accept a similar self-discipline. There have been signs of resentment against pressure for population control programmes in some developing areas. We believe, however, that in the end the adoption or non-adoption of such programmes is likely to depend more on the national interests of developing countries as they see them than by a consideration of what is happening elsewhere.

27. All these questions need to be looked at in the perspective of this country's membership of the EEC. The potentialities for increasing agricultural production in the EEC as a whole are very great. As members of an enlarged EEC we can expect to be much less affected by changes in supplies of food-stuffs from the rest of the world: and within the Community there should be more scope for reducing dependence on supplies of raw materials and energy from the rest of the world.

28. In the present context, the objective should be not to retreat towards an unattainable state of self-sufficiency, but to do all we can to foster sustainable patterns of world trade and development. This leads us to endorse the view of the United States Population Commission that what is required is to 'work positively and constructively with other countries and international

## *Conclusions and recommendations*

organisations in analysing and solving problems related to natural resources and the environment in the world'.<sup>1</sup>

### **III—General conclusions for policy**

29. We have tried to assess the implications of these considerations for Government policy.

30. Our first conclusion is that the population may well increase by 20% over the next 30 to 40 years. The age structure of the population is likely to be responsible for an increase of at least 10%: there is probably little which the Government could do to offset this. If average family size remains at about its present level there would be an additional increase of some 10%.

31. Our second conclusion is that at least in the perspective of the next 30 to 40 years there is little which can be done by way of this country's own domestic population policies to insulate ourselves against the possible disruptive consequences of population growth in the rest of the world.

32. Our third conclusion is that given a not too unstable world situation, Britain should be able to find means of accommodating any likely increase in population over the next 40 years. The situation is not such as to require immediate policy initiatives designed to reduce dramatically the rate of increase.

33. Our fourth conclusion is that while we do not know the optimum size of Britain's population nor do we see how on the basis of present knowledge any such optimum might be calculated, our analysis nevertheless leads us to the conclusion that Britain would do better in future with a stationary rather than an increasing population.

34. In concluding that a stationary rather than an expanding population would be more advantageous, we have been much influenced by the longer term prospects for population growth in Great Britain. We have suggested that 64 million early in the next century compared with 54 million in 1971 is probably the best working assumption for policy. Furthermore, while there should be no undue difficulty in accommodating the extra 10 million or so in prospect, a large number of policy problems would be easier to tackle if the rate of population growth were slower rather than faster. We have found no overwhelming arguments in favour of continuing population growth.

35. Looking further ahead to the middle of the next century, problems of accommodating a further 10 or 20 million people are likely to be progressively more difficult. Sooner or later, Britain must face the fact that its population cannot go on increasing indefinitely. Society will have to adapt itself to the social and economic implications of an age distribution consistent with a stationary population. Any socially acceptable measures to restrict population growth will inevitably take a long time to achieve their aim, and since the effectiveness of

---

<sup>1</sup> Report of the United States Commission on Population, chapter 5.

such measures is very uncertain, the time has come when the Government should consider whether, and if so, how to act to influence the rate of population growth.

#### **IV—First steps towards a population policy**

36. Hitherto, Governments have regarded the level and rate of increase of population as something which they take as given. At present, the rate of overall population growth reflects the sum of the behaviour of individual families. There is little reason to suppose that many families now take account of the implications of their individual behaviour for the overall rate of population increase; and it is very doubtful whether the aggregate of individual decisions produces the rate of overall population growth which those same individuals would choose. We do not think that in future Governments can afford to dissociate themselves from population questions. Public opinion now demands and the facts of the population situation require that the Government define its attitude to questions concerning the level and rate of increase of population. This implies that it should indicate the extent to which population issues influence its policies and its choice of priorities.

37. If it is accepted that the Government needs to have an explicit attitude to population questions, and it is further accepted that there are few if any advantages in continuing population increase, and that rising population exacerbates in a variety of ways many of the problems of contemporary society, what are the implications for Government policy?

38. First it is clear that the rates of increase in prospect over the next 30 or 40 years are not such as to require drastic action at this juncture. Second very little is known about the possible effects of different measures on population growth and there is therefore a need to improve information on population matters and investigate measures that affect population growth. For both these reasons the Government should proceed cautiously.

39. Most kinds of action which might be considered as methods of reducing the rate of population growth involve undesirable social consequences. Fiscal measures designed to provide a disincentive to childbearing by raising the cost of having children are bound by their very nature to affect adversely the welfare of children in individual families. We do not think that at this juncture circumstances are such to justify fiscal policy to influence people's decisions about the size of family they want to have.

40. Non-fiscal measures involving any element of compulsion imply interference with individual liberty and family life which would in present circumstances be politically, socially and morally repugnant, and we do not advocate them.

41. There is, however, one area of policy which can affect population growth which is not open to these objections. A large number of pregnancies are unplanned, and many of them are unwanted. Adequate knowledge of

## *Conclusions and recommendations*

reliable methods of contraception and access to such methods would result in many parents having smaller families. In this sense actual family size is often larger than desired family size.

42. We think that facts about population size and growth should be widely known, so that the public at large can see population problems in better perspective and so that people can make decisions about family size knowing the implications of their decisions not only for themselves, but also for the country as a whole.

43. Policy in regard to family planning services should take account of population implications instead of being decided, as at present, entirely in terms of its effects on health and social welfare. The first positive step towards a population policy should be the development of comprehensive family planning services as an integral part of the National Health Service, so that everyone knows of their existence and is free to use them.

44. We have considered the role of education in establishing attitudes to family planning and we consider that sex education and family planning ought to be part of an overall approach to moral education. We recognise that this has implications for the education system which will need very careful consideration. Information about family planning should be directed to all sections of the community. It will be necessary to ensure that contraception has a place in the training of all the health professions.

45. These measures on family planning should go some way to eliminating unwanted pregnancies. No one knows what the birth rate would be if all pregnancies were planned but it is doubtful if it would be reduced to replacement level as a result of these measures alone. Both the levels of unwanted and wanted pregnancies change from time to time, and a continuing analysis of the factors affecting the birth rate should be made.

46. Sterilisation, both male and female, is a very efficient form of contraception and it may have social and health benefits for individual families. Since it is often irreversible and may not be entirely free of long-term complications it should not be pressed on individuals. We do not think that sterilisation should be given a greater share of resources on population grounds alone, but resources should be made available as health and social considerations require.

47. Abortion is an important method of population control in some developing countries. In Britain contraceptive practice is sufficiently advanced to preclude reliance on abortion for population reasons. If there were an extension in family planning services as we suggest reliance on abortion would be further diminished.

48. The Abortion Act 1967 is recent and facilities for abortion vary from one area to another. A more uniform spread throughout the country might lead to an increased number of abortions within the terms of the Act. We see no reason for changes in the Abortion Act on population grounds.

49. It is sometimes suggested that emigration could solve the problems associated with population pressure. The majority of emigrants are younger adults who have already received their education in this country, and we lose their contribution to society for the rest of their productive lives. Emigration on a scale sufficient to have significant effects on total numbers would involve a substantial real cost. In addition, as the receiving countries rarely want people above middle age a larger outflow would distort the structure of our population. Moreover it is questionable whether other countries will continue to take people on the scale of the past. We do not consider that increased emigration should or could provide a major contribution to relieving population pressure.

50. Immigration policy is decided on social and humanitarian grounds and in the light of more definite and immediate factors than speculative long-term assessments of the future size of our population. At present the net effect of immigration and emigration on our population is very small, although the gross flows are substantial. Our position as a member of the European Community will introduce a new factor into the situation and the implications of this need to be further assessed.

## **V—The organisation required**

51. Our terms of reference require us to 'make recommendations about further work required and how it should be conducted'.

52. If the Government accepts our conclusion that the time has come for it to adopt an attitude on a population policy for this country then population affairs must become a Ministerial responsibility. But present knowledge of population trends, their causes and their implications provides an inadequate basis for policy. The main source of information is the census which takes place every 10 years. There is an urgent need to reduce our ignorance in these fields. We recommend that there should be a mid-term census in 1976, and that consideration should be given to the establishment of regular quinquennial censuses in future.

53. We think there should be a major stocktaking on population questions every five to ten years. The tabulation and publication of the detailed material from the 1971 Census will not be available until 1974. Analysis of the census material should be expedited and other studies put in hand, so that the first major stocktaking on population questions can start in 1975. The 1976 mid-term census would provide the basis for the next major stocktaking.

54. Work which should be put in hand immediately includes:

- (i) assembly and analysis of information which already exists but is not being effectively used,
- (ii) collection and analysis of new information,
- (iii) initiation of research,
- (iv) general monitoring, analysis and commentary.

## *Conclusions and recommendations*

55. The main fields for work are:

- (i) Fertility: present and recent trends; the factors which affect family formation; the causes and consequences of differences in fertility rates, including regional and social class differentials; the effect of divorce and remarriage on fertility patterns; trends in illegitimacy and factors relating to this; contraceptive methods, their use and their effectiveness; the relationship of abortion and sterilisation to fertility patterns.
- (ii) Mortality: the factors affecting mortality patterns, especially infant mortality; assessment of trends in causes of mortality; changes in mortality analysed by generations; differences in mortality patterns, including those of the very old, male/female differentials and effects on the structure of the population.
- (iii) Migration: factors affecting migration and its effects on the size, structure and growth of the population, implications of membership of the EEC.
- (iv) The implication of variations in rates of population growth for Government policies, e.g. housing, education, health, land use.
- (v) Genetics: genetic causes and genetic effects of varying family size, especially the heritability and correlation with fertility of IQ and other variables for which suitable tests exist or can be developed in different segments of the population, and at adequate intervals to detect trends.
- (vi) Aspects not clearly demographic, e.g. the costs of children, the relation of population size to such questions as congestion and land use.

56. Such a programme of work is inevitably rather wide ranging. Some of it must be carried out within Government because of the necessary links with Departments, or because Government is the repository of confidential data such as that from the census. But some work can and should be done outside Government.

57. At the moment very few people are working in this field and resources are limited. There is a need to strengthen the facilities for academic work generally in the field of population and we recommend the setting up of a centre for population studies. Demography is best studied in conjunction with such disciplines as economics and other social sciences in a university that has biological departments and a medical school. The staff of the centre would teach in the university and conduct research in the general field of demographic studies. Part of their research would be independent and part carried out under contract for Government or other bodies under normal customer-contractor principles. Such a relationship should not interfere with the independence of the centre nor preclude the placing of some Government research contracts elsewhere.

58. Within Government the programme of work requires both the expansion of certain activities and the co-ordination of existing and new activities and research.

59. The Office of Population Censuses and Surveys (OPCS) will need to be expanded and strengthened both for analysis of demographic data from the census and other sources and for survey work on motivation, family planning,

etc. ; and to carry out interpretative work. Funds should be made available to enable OPCS to commission research. Information and interpretative comment on population trends should be more widely disseminated than in the past and OPCS should consider the most effective means of achieving this. It could well extend its role in interpreting and disseminating information on population trends in Britain as a whole. We recommend that combined statistics for Great Britain be published regularly in future.

60. All Government Departments are concerned with population. Some need to take account of changes in population when considering future policies such as the demand for housing or schools, some have particular responsibilities for areas which are of demographic concern such as family planning or population distribution, and all deal with matters that either affect or are affected by population. There is no need to expand the resources of all these Departments of Government, but there is a need to provide a link at the centre and co-ordinate all work on population.

61. In addition it will be necessary to ensure that the right research is carried out, that the relevant information is collected and analysed, and that the results are made available on a continuing basis to those responsible for policy. Resources are limited and priorities in research must be established to avoid undesirable duplication of research programmes both inside and outside Whitehall. In determining a realistic research programme it will be necessary to assess in each case whether the prospect of obtaining some useful information is good enough to justify the effort and the use of resources.

62. Given the programme of work, the fields to be covered, the need for strong links with Departments and the establishment of priorities in research we conclude that there should be a central body responsible for organising, co-ordinating and ensuring implementation of the work programme.

63. Such a body would be the natural source of advice on population matters and would need to report to a Minister. If the Government adopts an attitude on a population policy Ministerial responsibility will in any event have to be established. Given the importance of population problems and their trans-departmental nature a senior non-departmental Minister would almost certainly be the most appropriate. It is unlikely that the work involved would occupy more than part of his time. Existing Departmental responsibilities would continue.

64. The work of the central body to a large extent determines its nature. The need for central support for the Minister and for co-ordination and strong links with Departments points to a small executive unit and a committee with members mainly from Departments. The terms of reference of the committee should require it to co-ordinate and determine priorities in the population field. For these reasons it would be best placed within the Cabinet Office. The unit would provide support for the Minister, would service the committee, and would have direct responsibility for some expenditure on outside research; it would be headed by a senior official who would also act as Chairman of the Committee.

### *Conclusions and recommendations*

65. Summarising our conclusions on organisation we see the need for:

- (i) special responsibility for population matters to be given to a senior non-departmental Minister;
- (ii) a small executive group on population matters in the Cabinet Office and a co-ordinating interdepartmental committee; the head of the group to be Chairman of the Committee;
- (iii) a mid-term census in 1976;
- (iv) a major stocktaking of population questions to start in 1975;
- (v) the establishment of a new centre of demographic studies within a university;
- (vi) an expansion of the work of the OPCS.

## PART II

### SUPPORTING ANALYSIS

	<i>Page</i>
Chapter 1—The world perspective .. . . . .	17
Chapter 2—Population growth in Britain .. . . . .	27
Chapter 3—Implications of population growth over the next forty years	57
Chapter 4—Britain in the next century .. . . . .	93
Chapter 5—Population and policy .. . . . .	101

**Submitted to the Lord President of the Council**

*February 1973*



## TABLES

	<i>Page</i>
<b>Table 1</b> World population growth, 1750–2000 .. . . . .	19
<b>Table 2</b> Population growth—the developing and the developed countries, 1750–2000 .. . . . .	20
<b>Table 3</b> Population growth in the developed countries, Europe and Great Britain, 1750–2000 .. . . . .	21
<b>Table 4</b> Demographic indicators for Great Britain and six other countries, 1971 .. . . . .	22
<b>Table 5</b> Population size, growth and structure, 1801–1971: Great Britain	29
<b>Table 6</b> Components of average annual change in population, 1901–1972: Great Britain .. . . . .	30
<b>Table 7</b> Expectation of life, 1851–1971: Great Britain .. . . .	32
<b>Table 8</b> Mortality rates, 1901–1971: Great Britain .. . . .	32
<b>Table 9</b> Births—numbers and rates, 1955–1972: Great Britain ..	35
<b>Table 10</b> Age specific fertility rates for given cohorts of women: Great Britain .. . . . .	38
<b>Table 11</b> Distribution of family size in Great Britain .. . . .	40
<b>Table 12</b> Births outside marriage, 1951–1971: Great Britain .. . .	41
<b>Table 13</b> Average family sizes of women married in 1955: Great Britain	43
<b>Table 14</b> Proportion of women having a child within the first two years of marriage, 1951–1970: Great Britain .. . . . .	44
<b>Table 15</b> Family size—Roman Catholic and other unbroken first marriages: Great Britain .. . . . .	45
<b>Table 16</b> Population models for Great Britain, 1971–2011 .. . .	50
<b>Table 17</b> Age distribution of model populations, 2011 .. . .	51
<b>Table 18</b> Two models of family size consistent with replacement level fertility .. . . . .	52
<b>Table 19</b> Family size distribution: very low fertility model .. . .	53
<b>Table 20</b> Population 1971–2051: very low fertility model: Great Britain	54
<b>Table 21</b> Age distribution 1971–2051: very low fertility model: Great Britain .. . . . .	54
<b>Table 22</b> Population growth and labour input, 1971 to 2011 .. . .	61
<b>Table 23</b> Factors in the growth of output, 1971 to 2011 .. . .	67
<b>Table 24</b> Investment in 1971 and 2011 .. . . . .	71
<b>Table 25</b> Consumption and consumers: 1971 and 2011 .. . .	74
<b>Table 26</b> Some measures of welfare in 2011 .. . . . .	76
<b>Table 27</b> The effect of varied assumptions on population growth/welfare comparisons .. . . . .	77
<b>Table 28</b> Population and urban land needs in Great Britain, 1971 and 2011 .. . . . .	81
<b>Table 29</b> The urban land balance in Great Britain, 1971 and 2011 ..	83
<b>Table 30</b> British population to 2051 .. . . . .	95
<b>Table 31</b> Age structure in 2051 .. . . . .	96

*Tables*

	<i>Page</i>
<b>Table 32</b> Deaths per million maternities by age and parity, 1967-69	113

**TABLES in PART III**

<b>Table 33</b> Summary of model	.. .. .. .. .. ..	130
<b>Table 34</b> Abortions in England, Wales and Scotland	.. .. ..	133

## CHAPTER 1

### THE WORLD PERSPECTIVE

					<i>Paragraph</i>	<i>Page</i>
					67	19
World population 1750–2000	..	..	..	..	73	21
Britain and the developing countries	..	..	..	..	75	21
Britain and the developed countries	..	..	..	..	77	22
Britain and six other industrialised countries	..	..	..	..	80	23
Britain and the world	..	..	..	..	84	23
World problems	..	..	..	..	..	25
International action	..	..	..	..	95	



## CHAPTER 1

### THE WORLD PERSPECTIVE

66. Our terms of reference do not require us to consider world problems. Nevertheless any discussion of British population problems which did not take account of developments elsewhere would be seriously incomplete, as British and global problems interact. We have therefore considered world population growth and its significance for Britain.

#### World population 1750–2000

67. In 1800 world population was about 1,000 million and increasing at the rate of about 5 million a year. By the end of this century it is expected to be 6,500 million, increasing over the last 30 years of the century by 95 million a year on average. Table 1 sets out the best estimates the United Nations has been able to make of population over the 250 years from 1750 to the year 2000.

TABLE 1  
World population growth, 1750–2000

	Population at end of period	Average yearly increase in population in the period	
		Millions	Millions
1750–1800	978	4	0·4
1800–1850	1,262	6	0·5
1850–1900	1,650	8	0·5
1900–1950	2,486	17	0·8
1950–1970	3,632	57	1·9
1970–2000	low*	5,449	61
	medium*	6,494	95
	high*	6,994	112

Source: United Nations.

\*The United Nations have made projections with three variants of fertility<sup>1</sup> because of the uncertainties in looking so far ahead. The medium variant is the one most generally used.

68. Britain's share of the world population was 1% in 1800, rising to just over 2% by 1900 and then by 1970 had dropped to 1½% with a population of some 54 million. Although Britain's population will go on growing until the end of the century the total world population will grow so much faster that Britain's share seems likely to fall to less than 1%. The projected yearly increase between 1970 and 2000 is around a quarter of a million a year. This is an average rate of increase of 0·4% a year, compared with 2·0% for the world as a whole.

<sup>1</sup> Fertility is not used in the biological sense but refers to the rate at which births in fact occur to women of childbearing age.

69. Estimates of total world population do not tell the whole story. Table 2 shows the differences between the developing countries and the developed countries.<sup>1</sup>

TABLE 2

**Population growth—the developing and the developed countries, 1750–2000**

	Population at end of period		Average yearly increase in population in the period			
	Millions		Millions		%	
	Developing countries	Developed countries	Developing countries	Developed countries	Developing countries	Developed countries
1750–1800	730	248	3	1	0·4	0·4
1800–1850	915	347	4	2	0·4	0·7
1850–1900	1,077	573	3	4½	0·3	1·0
1900–1950	1,628	858	11	6	0·8	0·8
1950–1970	2,542	1,090	46	12	2·3	1·2
1970–2000	low*	4,155	1,293	54	7	1·7
		5,040	1,454	83	12	2·3
		5,420	1,574	96	16	2·6

Source: United Nations.

\*See footnote to Table 1.

70. During the nineteenth century the population of those countries now classified as developed was increasing by about 1% a year. From 1900 to 1950 their annual growth averaged 0·8% and then accelerated to 1·2%. Over the next 30 years however it is expected to drop to 1% again. Although the developed countries now account for some 30% of the world's population they are expected to contribute only 13% of the total increase in world population over the next 30 years.

71. On the other hand, the population of the developing countries increased by 0·3–0·4% a year in the nineteenth century. Since 1900 the rate of increase has doubled then doubled again or more. It is now over 2% a year. The United Nations medium projection gives a yearly increase of 2·3% over the next 30 years.

72. In 1800 the developed countries had one-quarter of the world's population, but during the next hundred years their population grew faster than that of the rest of the world and by the end of the century accounted for over one-third of the world total. During this century, however, the trend has been reversed. There is little doubt that the developing countries will increase their share of world population, and the share of the developed countries will drop from one-third to one-fifth of the total.

<sup>1</sup> The developed countries are defined as those in Europe, North America, temperate South America, USSR, Japan, Australia and New Zealand (United Nations definition).

### **Britain and the developing countries**

73. Comparisons are sometimes made between the experience of developing countries now and Britain in the early nineteenth century. On this basis it is argued that the population growth rates of developing countries must soon decline. Such comparisons are misleading. In the developing countries the birth rate is now about 40 per 1,000, which is higher than Britain's was then, and the death rate, at about 16 per 1,000, is lower. Thus the rate of growth in the developing countries is much higher than Britain ever experienced.

74. Moreover death rates in these countries are expected to fall far faster than those in Britain ever did and the age structure of their population is even more favourable to population growth than Britain's was, because they have a larger proportion of young people. Unless their birth rates also drop very substantially, the population of the developing countries will continue to expand much faster than Britain's did in the nineteenth century.

### **Britain and the developed countries**

75. Table 3 shows population growth in the developed countries as a whole and for Europe and Great Britain separately. Great Britain accounts for some 5% of the total population of the developed countries but is growing only half as fast as the group as a whole; it will therefore account for only  $2\frac{1}{2}\%$  of the population increase of the developed countries up to the end of this century.

**TABLE 3**  
**Population growth in the developed countries, Europe† and Great Britain**  
**1750–2000**

	Population at end of period			Average yearly increase in population in the period					
	Millions			Millions			% Developed countries Europe† Great Britain Developed countries Europe† Great Britain Developed countries Europe† Great Britain		
	Developed countries	Europe†	Great Britain	Developed countries	Europe†	Great Britain	Developed countries	Europe†	Great Britain
1750–1800	248	152	10.9	0.9	0.5	0.1	0.4	0.4	0.7
1800–1850	347	208	20.8	2.0	1.1	0.2	0.7	0.6	1.4
1850–1900	573	296	37.0	4.5	1.8	0.3	1.0	0.7	1.2
1900–1950	858	392	48.9	5.7	1.9	0.2	0.8	0.6	0.6
1950–1970	1,090	462	54.0	11.6	3.5	0.3	1.2	0.8	0.5
1970–2000	1,454	568	60.9	12.1	3.5	0.2	1.0	0.6	0.4

*Source:* United Nations for developed countries and Europe; Great Britain current national statistics.

†Excluding USSR.

\*United Nations medium projection 1965-based, for the developed countries and Europe. Great Britain, official 1971-based projection with allowance for migration

76. In 1800 the population of Europe accounted for just over half of the population of the developed group of countries: by the end of this century it will probably have dropped to nearer a third. Britain's population is 12% of the population of Europe. Over the last 20 years it has grown rather more

## *The world perspective*

slowly than that of most other European countries. Over the next 30 years growth rates in Great Britain and Europe as a whole will probably be broadly similar and, on the United Nation's medium fertility assumption, will be of the order of  $\frac{1}{2}\%$ .

### **Great Britain and six other industrialised countries**

77. Table 4 compares Great Britain with six other highly industrialised countries. The demographic indicators are those which are frequently used for purposes of comparison.

**TABLE 4**

#### **Demographic indicators for Great Britain and six other countries, 1971**

	Great Britain	France	West Germany	Netherlands	Sweden	USA	Japan
Population (millions)	54.1	51.3	59.2	13.2	8.1	207.0	104.7
Increase 1961-1971	5%	11%	10%	13%	8%	13%	11%
Population density (persons per square Km.)	235	94	239	323	18	22	283
Age structure (% of total) <sup>1</sup>							
0-14	24.1	23.7	24.9	27.5	20.9	28.5	24.0
15-44	38.9	41.6	40.6	42.5	40.1	41.1	51.3
45-60	18.3	15.9	16.9	15.6	19.7	16.3	14.3
Over 60	18.7	18.8	17.6	14.4	19.3	14.1	10.5
Crude birth rate (births per 1,000)	16.1	17.1	12.8	18.8	14.1	17.3	19.2
Births per 1,000 females aged 15-44 <sup>2</sup>	84	85	67	92	69	82	71
Crude death rate (deaths per 1,000)	11.6	10.7	11.7	8.4	10.2	9.3	6.6
Rate of natural increase (per 1,000)	4.5	6.4	1.1	10.4	3.9	8.0	12.6
Expectation of life at birth <sup>3</sup> (years): Male	68.6	68.0	67.6	71.0	71.8	66.6	69.0
Female	74.9	75.5	73.6	76.4	76.5	74.0	74.3

*Source:* United Nations, Office of Population Censuses and Surveys.

<sup>1</sup> Latest figures available from the United Nations relate to 1968 for France, West Germany; 1969 for Netherlands, Sweden, Japan; 1970 for USA. 1971 data for Great Britain.

<sup>2</sup> Estimates for 1971 obtained by up-dating from the latest year given by the UN (see note 1).

<sup>3</sup> Latest available figures relate to years around 1968.

78. Population density varies from 18 persons per square kilometre in Sweden to 323 in the Netherlands. By itself, however, population density is an inadequate measure since it takes no account of the quality or type of land, the economic and social structure of the country, nor the distribution of the population within the country.

79. The age structure of a population is largely the result of past population growth: countries with young populations are also those with the more rapid growth rates. Net immigration of foreign workers has, however, led to

increased population growth, particularly in the other EEC countries. Of the seven countries the one with the lowest growth rate of population over the last 10 years is Great Britain.

### **Britain and the world**

80. Although Britain's population is a small and declining fraction of world population, British imports are a more substantial fraction of world trade. These demands are likely to decline proportionately in the future; both population growth and economic growth are smaller in Britain than in most other developed countries. Any likely reductions in the rate of growth of the British population would only alter our import requirements by a small fraction and have a negligible effect on world demands.

81. The impact of the world on Britain, however, is considerable. Britain's need for imports means a considerable export trade but import prices are largely fixed in world markets. Since British demands are small in world terms world prices are hardly affected by them. So long as orderly world trading conditions prevail and the necessary goods are available on world markets we see no reason why we should not be able to import what we need by appropriate exchange rate policies and the general management of the economy. Availability and prices of supplies will depend on world events, not the growth of population in Britain.

82. Violent changes in world trading conditions leading to extremely rapid price increases would have different effects on Britain according to whether we have a small or large population. If the changes are sufficiently large there would be some small benefit in having a smaller rather than a larger population. A general and prolonged breakdown of trade would have very serious consequences whatever the size of our population.

83. These problems need to be looked at in the light of our membership of the EEC. At present there is a surplus of some foodstuffs within the EEC and considerable potential for raising agricultural productivity. Britain can therefore be expected to be less affected by changes in supplies of foodstuffs from outside the EEC than heretofore. In addition, by co-operation within the EEC there should be some scope for reducing dependence on raw materials from the rest of the world.

### **World problems**

84. The doubling of world population in the next 30 to 40 years and the expected rise in the standard of living both in the developed and the less developed countries, implies increasing demands for food, raw materials and energy sources, with a probable consequential increase in pollution and ecological side-effects. There is widespread concern about the possibility of satisfying these increased demands, halting the increase in pollution and counteracting the ecological effects.

85. The questions at issue are complex. Many are technical, requiring views on scientific matters of a specialised nature, and all require views on future

## *The world perspective*

populations, social institutions and the relationships between nations. Answers to many of the questions may well prove impossible.

86. The world food problem, at present and in prospect, is primarily a problem for the less developed countries. The developed countries feed themselves either from their own resources or by trade among themselves. For example Britain largely imports temperate foodstuffs from Canada, the United States, Australia, New Zealand and Europe. Given the slow growth rate of the population of the developed countries, their rising agricultural productivity and a continuation of world trading arrangements, this condition of self-sufficiency is likely to continue. Slowing down their rate of population growth even further would have little effect on food supplies for the rest of the world.

87. The situation in the less developed countries is much more difficult. In parts of Asia, Africa and Latin America malnutrition is widespread, and the threat of large scale famine uncomfortably close. In these conditions the dangers of population increase are serious. On the other hand, the development of new strains of wheat and rice, and the general improvements in agricultural productivity in the less developed countries offer the hope that serious disaster may be avoided. What is quite clear is that—as many of them have recognised—the development problems of the less developed world are made much more difficult by the rate at which their populations are increasing.

88. Resource problems are primarily those of developed countries. Essentially the problem is that any one resource, such as copper, is limited, but demands are growing exponentially and may ultimately exhaust the supply. Not all resources have yet been discovered and it may be possible to use ores of a lower metallic content. Changing technology could reduce demands for particular resources and lead to the use of substitutes. The price mechanism should indicate when a resource is becoming limited, help to foster substitutes and lead to decreasing demand.

89. It is clear that the demands of the developed countries for resources depend largely on their rates of economic growth, which are considerably faster than those of their populations. Slowing down their population growth alone would have only a marginal effect on the problem of world resources.

90. Britain and other developed countries import huge quantities of raw materials from the less developed countries who use the proceeds to import food supplies and capital goods to raise their own standards of living. Action by the developed countries to restrict their demands for resources would, given present trading arrangements, almost certainly exacerbate the problems of the less developed world.

91. Problems of future energy supplies are slightly different from resource problems generally. The potential supply of energy in the form of electricity provided by nuclear power stations, is large, although there will be considerable problems associated with the disposal of nuclear wastes. Large coal reserves are available for use as a source of raw materials; but it seems possible that oil

and natural gas reserves might be substantially run down within the next 40 years. The major energy problem lies in the adaptation of the economies of the advanced countries to new sources, and this is not directly dependent on the rate of growth of their populations.

92. It is likely that efforts to meet the demands of the expanding world population and to improve its standard of living will sooner or later have severe environmental effects on a global scale, and consequently on Britain, unless international action can be developed to control them. World atmospheric and climatic effects have been considered by the Royal Commission on Environmental Pollution (First Report).<sup>1</sup> Extensive industrialisation of the less developed countries will have to take place before these effects become serious. The pollution of the oceans by man-made chemicals and by oil may in the short run be of greater importance.

93. Any physical changes in the general environment are highly likely to have repercussions on the distribution and numbers of animals and plants. The interrelations of organisms are, however, so complex and the science of ecology so much in its infancy that little can be predicted. But it must be remembered that a small change in the composition of air or sea may conceivably tip a balance within a community of plants and animals and produce a conspicuous loss to our amenity or economy.

94. The animals and plants in and around Britain may be affected not only by global changes in the environment produced by a vast world human population, but by the inevitable changes in food production that must support man's increasing numbers. It is conceivable that a breakdown of control measures may allow the generation of large populations of pests or parasites, with perhaps a consequent risk of spread to this country. It is however improbable that any of these world environmental problems will be critical for Britain in this century.

### **International action**

95. It is clearly impossible for world population growth to continue indefinitely at the present rate, involving as it does a doubling every 35 years or so. Those now in early middle age are likely to live in a world which has grown from 3,700 million to 7,000 million people and the children of today could live in a world population of twice that size. Growth of this order within so short a time is bound significantly to affect international economic and political relationships.

96. Given that unilateral action by one country will not alleviate world problems or insulate that country from the world it is clear that the world population problem can only be tackled by collective international action. Work has been started by the United Nations and its specialised and regional agencies to alert countries to the effects of population increase, and the problems of world resources.

---

<sup>1</sup> Cmnd. 4585 February 1971. See also *Man's Impact on The Global Environment: Report of the Study of Critical Environmental Problems*, MIT Press, 1970.

### *The world perspective*

97. Following the important United Nations conference on the Human Environment in June 1972, the year 1974 has been designated World Population Year and there will be a World Population Conference. Individual countries and institutions are involved in detailed work on pollution, resources and food and are analysing and amplifying the computer models of possible world trends. The United Kingdom Government has set up a World Trends Unit in the Department of the Environment to consider these and related problems. The United Kingdom's main contribution to tackling world population problems will be to support the efforts of the United Nations and to play a full part in its work.

## CHAPTER 2

### POPULATION GROWTH IN BRITAIN

	<i>Paragraph</i>	<i>Page</i>
<b>Population Trends</b>		
Broad changes over the nineteenth and twentieth centuries .. .. .. .. ..	98	29
The longer term trend in mortality .. .. ..	107	31
Migration as a component of population change ..	113	33
Movements in births over the post-war period ..	120	34
<b>Changes in Fertility Patterns</b>		
The technical problem .. .. .. ..	127	36
Cohort fertility patterns: generation fertility ..	133	37
Family size .. .. .. .. ..	143	40
Illegitimate births .. .. .. .. ..	147	41
Divorce .. .. .. .. ..	150	41
Trends in marriage patterns .. .. .. ..	152	42
The timing of births .. .. .. .. ..	157	43
<b>The Determinants of Fertility</b>		
Changing family size .. .. .. .. ..	161	44
What determines family size .. .. .. .. ..	164	44
i. Religion .. .. .. .. ..	165	45
ii. Social class .. .. .. .. ..	167	45
iii. Education .. .. .. .. ..	170	46
iv. Employment .. .. .. .. ..	171	46
v. Cost of children .. .. .. .. ..	173	46
vi. Housing .. .. .. .. ..	178	47
vii. Concern about population .. .. .. .. ..	179	47
viii. Other factors .. .. .. .. ..	180	48
Future family size .. .. .. .. ..	181	48
<b>Population Projections</b>		
Population models .. .. .. .. ..	187	49
The 1970 based models .. .. .. .. ..	191	49
1971 based models .. .. .. .. ..	192	49
Replacement fertility and family size .. .. .. .. ..	201	52
A very low fertility model .. .. .. .. ..	204	53
The length of generations .. .. .. .. ..	210	55



## CHAPTER 2

### POPULATION GROWTH IN GREAT BRITAIN

#### POPULATION TRENDS

##### Broad changes over the nineteenth and twentieth centuries

98. We look first at current population trends in Britain in a historical perspective. Table 5 summarises the changes since 1801—the date of the first census.

**TABLE 5**  
**Population size, growth and structure, 1801–1971<sup>1</sup>**

(Great Britain)

	Population (millions)	Increase over preceding decade		Age structure (%)			
		millions	%	Under 15	15–44	45–59	60 and over
1801 <sup>2</sup>	10.9	(1.1)	(10)	(39)	(42)	(11)	(7½)
1851	20.8	2.3	12	35.5	45.9	11.3	7.3
1901	37.0	4.0	11	32.5	47.9	12.1	7.4
1911	40.8	3.8	10	30.8	47.9	13.3	8.0
1921	42.8	1.9	4.6	27.9	46.8	15.9	9.4
1931	44.8	2.0	4.6	24.2	46.9	17.4	11.5
1941	46.9	2.1	4.6	21.0	46.9	18.0	14.1
1951	49.2	2.3	4.7	22.4	42.9	19.0	15.7
1961	51.5	2.3	4.7	23.2	39.7	20.1	17.0
1971	54.1	2.6	4.9	24.1	38.9	18.3	18.7

*Source:* Office of Population Censuses and Surveys.

<sup>1</sup> Up to 1931 census enumerated population: after 1941 Total population (including British Armed Forces overseas, excluding foreign Armed Forces in Britain) as estimated at mid-year.

<sup>2</sup> For 1801 population size is that given by the 1801 Census, adjusted for under-enumeration; the increase in population is that for the succeeding decade 1801–1811; the age structure is that of 1821 when the population was 14.1 millions. The figures are approximate.

99. At the beginning of the nineteenth century there were about 10 million people living in Great Britain. The population almost doubled in the first half of the century, and in the second half it almost doubled again. Throughout the century annual rates of growth exceeded 1%, though they were slackening towards the end. Since the end of the first world war the annual rate of growth has been about  $\frac{1}{2}\%$ . In absolute numbers, the maximum increase of 4 million occurred in the decade 1891–1901; the increase was  $2\frac{1}{2}$  million in the decade 1961–71.

100. There is no agreement about the relative importance of mortality and fertility in bringing about the acceleration in the growth rate of the first half of the nineteenth century. Most demographers believe that it was due to a fall in the death rate while the birth rate remained high. In the nineteenth century

## *Population growth in Britain*

both the birth rate and the death rate were high by modern standards. Consequently Britain had a young age structure, i.e. a large proportion of young people. It is generally agreed that fertility began to fall from about 1880 onwards though actual numbers of births reached their peak between 1900 and 1905.

101. The shift in age structure occurred largely because the birth rate fell in the early years of the century, and this led to smaller numbers of births after the first world war. Since 1941, however, the proportion of the population under age 15 has increased. This is a reversal of the downward trend which has been operative since the nineteenth century, and a reflection of the recovery in births after the low point of the 1930s.

102. Table 6 below shows the components of population change in this century.

**TABLE 6**  
**Components of average annual change in population, 1901–72**

(Thousands and rates per 1,000 population) (Great Britain)

Period	Total change		Live births		Deaths		Natural increase		Estimated <sup>2</sup> net migration	
	000s	Rate	000s	Rate	000s	Rate	000s	Rate	000s	Rate
1	2	3	4	5	6	7	8	9	10	11
1901–11	383	9.8	1,060	27.2	601	15.4	459	11.8	— 76	— 2.0
1911–21	194	4.6	947	22.7	602 <sup>3</sup>	14.4	345 <sup>2</sup>	8.3	— 86 <sup>3</sup>	— 2.1
1921–31	203	4.6	793	18.1	534	12.2	259	5.9	— 56	— 1.3
1931–41	211	4.6	691	15.1	570 <sup>3</sup>	12.4	121 <sup>2</sup>	2.6	+ 100 <sup>3</sup>	+ 2.2
1941–46	192	4.1	781	16.5	554 <sup>3</sup>	11.7	277 <sup>2</sup>	4.8	— 2 <sup>3</sup>	— 0.0
1946–51	262	5.4	876	18.1	576	11.9	300	6.2	— 38	— 0.8
1951–56	166	3.3	768	15.5	568	11.5	200	4.0	— 35	— 0.7
1956–61	304	6.0	849	16.7	588	11.6	261	5.1	+ 43	+ 0.8
1961–66	319 <sup>4</sup>	6.1	955	18.3	617	11.8	338	6.5	— 1 <sup>4</sup>	— 0.0
1966–71	204 <sup>4</sup>	3.8	904	16.9	628	11.7	276	5.1	— 50 <sup>4</sup>	— 0.9
1971–72	165 <sup>4</sup>	3.1	831	15.4	644	11.9	187	3.5	— 22 <sup>4</sup>	— 0.4

Source: Office of Population Censuses and Surveys.

<sup>1</sup> Up to 1931 census enumerated population; 1941 and after—mid-year estimates of Total population.

<sup>2</sup> Approximate figures. From 1941 onwards they relate to net civilian migration: before that they include the net movements of Armed Forces to overseas countries. From 1961 data independent of the census incorporated.

<sup>3</sup> Excluding deaths of non-civilians who died outside the country.

<sup>4</sup> Provisional.

103. The natural increase in the population, i.e. the difference between the number of births and the number of deaths, fell from nearly half a million a year at the beginning of the century to little more than 100,000 a year in the

1930s. Over the post-war period the average has fluctuated between 200,000 a year in the early 1950s to over 300,000 a year in the early 1960s; in the most recent period (1971–72) natural increase was below 200,000. When related to the total size of the population this means that 70 years ago for every 1,000 persons at the beginning of the year there were 1,012 at the end of the year, whereas currently for every thousand persons at the beginning of the year there are 1,003 at the end of the year.

104. There were over 1 million births a year at the beginning of the century. In the 1930s they were less than 700,000—their lowest point this century. Then births increased again and the period 1946–50 saw the post-war baby boom. 1947 was the peak year with 994,000 births, about 14% above the average of 1946–51. The Royal Commission on Population<sup>1</sup> reporting in 1949 regarded the high level of births in the immediate post-war period as a temporary phenomenon caused by births postponed during the war. There was indeed a return to a lower level in the first half of the 1950s but this was followed by another increase between 1956 and 1964. Since 1965 births have been falling.

105. Age specific mortality rates, the proportion of persons in a particular age group who die in any one year, fell throughout the nineteenth and twentieth centuries. Between 1890 and 1930 the reduction in mortality was so great that the annual total number of deaths was actually falling. Since the early 1940s the number has increased because of the rise in the total number of old people. The overall death rate has also stopped falling as the proportion of old people in the population has increased.

106. Over the three decades from 1941 the irregularities in the natural increase of the population—the excess of births over deaths—have echoed the fluctuations in numbers of births, modified by the increased numbers of deaths over the last 20 years: death rates fluctuate much less than birth rates.

#### **The longer term trend in mortality**

107. The decline in mortality which started some 200 years ago means that on average people are now living longer. Table 7 shows how the expectation of life has increased over the past century. Life expectancy is defined as the length of life remaining at birth, or some later age, to a person on the assumption that his chances of survival at each year of age were to be equal to those prevailing at that age in the population as a whole, during the year for which life expectancy is calculated.

108. For males, given the prevailing mortality patterns of 1851, the expectation of life at birth was 40 years. By 1971 it had risen to 68½ years. The corresponding figures for females are 42 years in 1851, rising to nearly 75 years in 1971. Lower death rates in the early years of life account for a large part of the total increase in the expectation of life. For instance, Table 7 shows that for males expectation of life at birth increased by 22–23 years between 1901 and 1971. For those who had already survived to age 5, however, expectation of further life increased by only 10 years.

<sup>1</sup> Report of the Royal Commission on Population Cmd. 7695 June 1949.

*Population growth in Britain*

TABLE 7  
Expectation of life, 1851-1971

(Great Britain)

	1851	1901	1911	1921	1931	1951	1961	1971
Expectation of life (in years)								
At birth males	40	46	51.4	55.4	58.4	66.2	67.9	68.6
females	42	49	55.2	59.3	62.5	71.2	73.8	74.9
At age 5 males	50	55	57.0	58.3	60.0	63.9	65.0	65.2
females	50	57	59.7	61.1	63.0	68.5	70.5	71.2

Source: Office of Population Censuses and Surveys.

109. Mortality rates have continued to fall throughout the twentieth century but there are now some signs that the overall rate of fall is slackening. There has been little improvement lately in mortality among middle aged men. Mortality in childhood and early adult life is now extremely low. Of those who live until their first birthday, 95.1% of the males and 96.8% of the females survive to age 45. The loss of life between the ages of 1 and 45 i.e. the end of the main child producing period, is now so low that whatever further decline might occur in future it cannot have much absolute effect on the proportion of the population who survive to the end of the childbearing period.

110. Table 8 summarises the information about mortality rates in this century:

TABLE 8  
Mortality rates (deaths per 1,000 population at each age)  
1901-1971

(Great Britain)

	Rates per thousand population in each age-group							
	Under 1*	1-4	5-44	45-54	55-64	65-74	75-84	85+
<i>Males</i>								
1901	162	21	5	18	33	69	140	278
1911	140	19	5	15	30	65	136	270
1921	94	11	4	13	25	57	130	266
1931	78	8	3	11	24	59	140	297
1951	35	1	2	9	25	59	138	308
1961	24	1	1	8	22	55	125	264
1971	22	1	1	7	21	52	119	243
<i>Females</i>								
1901	134	21	5	14	26	57	122	248
1911	115	18	4	11	23	52	116	235
1921	73	10	3	9	20	47	110	234
1931	59	7	3	8	18	45	116	263
1951	26	1	1	5	13	38	106	256
1961	19	1	1	5	11	31	89	221
1971	15	1	1	4	10	27	78	194

Source: Office of Population Censuses and Surveys.

\*Deaths in the first year of life, per 1,000 live births.

111. Causes of death have changed radically within the last 100 years. Infectious diseases, such as scarlet fever, diphtheria and whooping cough which were once a major cause of death, particularly of young children, now account for negligible numbers. Deaths from typhoid and tuberculosis have similarly declined. The chief causes of death now are the degenerative diseases such as cancer and diseases of the circulatory system whose incidence increases with age.

112. Significant further reductions in overall mortality can only come from further reductions in infant mortality and the mortality of the elderly. While we cannot discount the likelihood of further reductions in the mortality of the elderly, for example, by means of a breakthrough in the treatment of cancer or the circulatory diseases, it is more likely that in future the overall rate of decline of mortality will not be as great as in the past 100 years. The fall in the number of deaths, which was a major cause of population growth in the past, was due to once for all factors and comparable changes are very unlikely to occur again.

### **Migration as a component of population change**

113. The effect of migration has been much smaller than the effect of natural change. There are many problems in compiling consistent and accurate historical series of migration figures, and those shown in Table 6 should be taken as orders of magnitude only. The table shows that while net migration rates fluctuate their effect on overall population change is smaller than natural increase. There are however certain indirect effects on population change because of the age structure and fertility of migrants. The comparatively small net figures are the difference between very much larger figures of immigrants and emigrants, and it is the differences in their ages and in their fertility which gives rise to the indirect effects.

114. In this century emigration has exceeded immigration except for two periods. In the 1930s there was a considerable flow of refugees into Britain from Europe, and at the same time the economic depression cut down outlets for emigrants from Britain. Then towards the end of the 1950s and in the early 1960s there was a substantial influx from the New Commonwealth. The present picture is one of net inward migration from foreign countries and the New Commonwealth, with relatively small additions from the Irish Republic and the Old Commonwealth. The net outward migration of persons of British birth outweighs the net inward flows.

115. In numbers net migration has been of little importance in overall population change but the characteristics of the immigrants and the emigrants are different. Immigrants are largely young adults whereas adult emigrants tend to be slightly older and often move in family groups with children. With so many young people among the immigrants it was to be expected that currently they would be responsible for a relatively high number of births. But in addition immigrants from the New Commonwealth and from the Irish Republic tend to have families larger than the national average. Again, because of the high proportion of young persons, deaths of immigrants are currently relatively low.

## *Population growth in Britain*

116. There are about 1 million coloured people now living in this country, 2% of the total population. Most of them arrived during the last 15 years. About 40,000 births a year, 5% of all births, are to parents both of whom are coloured. In addition some 10,000 are to mixed marriages. In contrast there are only 3,000 to 4,000 deaths of coloured people—about  $\frac{1}{2}\%$  of all deaths.

117. Although therefore coloured immigrants currently account for a significant part of the overall natural increase of population in Britain, the situation will clearly change as they grow older and deaths among them increase. Experience of migrant fertility in other countries suggests it is likely to move towards the national average. In other words, in the longer run they can be expected to contribute to natural increase in something more like their proportion in the population.

118. Those at present living in Britain who were born in the Irish Republic number some 720,000. Again there is a relatively high proportion of young persons in this group. In 1971 there were 11,000 births where both parents were born in the Irish Republic and a further 22,000 to mixed marriages; there were 9,000 deaths of Irish immigrants.

119. We have no basis on which to make an equivalent calculation of the reduction in the natural increase of the population of Great Britain caused by the emigration of those born in Britain. There is a reasonable presumption that over recent years the reduction in this country's natural increase from emigration has been smaller than the addition from immigration.

## **Movements in births over the post-war period**

120. In looking at the factors that are now significant in relation to variations in population growth in this country and therefore to future growth, mortality and migration are relatively unimportant. It is fertility that matters. Table 9 shows how births increased each year from 1955, reaching a peak in 1964. Since then they have fallen each year.

121. Any meaningful analysis of births must obviously relate them to the size and characteristics of the population. Table 9 shows various annual measures which are commonly used: the birth rate per 1,000 population of all ages; the general fertility rate; the gross reproduction rate; the net reproduction rate and the total period fertility rate.

122. The general fertility rate is obtained by relating the number of births in a given year to the population of women of reproductive age in that year (conventionally taken as 15–44 years). This measure is liable to be affected by the age distribution of women of reproductive age. The gross reproduction rate is freed of the effects of such age distortions and is calculated as a pure measure of fertility. It is the number of daughters a woman would produce, if she survived to the end of her reproductive period, and throughout her life were subject to the age-specific fertility rates of the year for which the gross reproduction rate is calculated.

TABLE 9  
Births—numbers and rates, 1955–1972

(Great Britain)

Year	Live births (thousands)	Birth rate per 1,000 population of all ages	General fertility rate per 1,000 women aged 15–44	Reproduction rate		Total period fertility rate
				Gross	Net	
1955	760	15.3	74.1	1.09	1.05	2.24
1956	796	16.0	78.2	1.16	1.12	2.38
1957	821	16.4	81.2	1.21	1.16	2.47
1958	840	16.7	83.3	1.24	1.19	2.53
1959	848	16.8	84.0	1.24	1.20	2.56
1960	886	17.4	87.7	1.30	1.26	2.69
1961	912	17.8	89.9	1.35	1.31	2.78
1962	943	18.2	91.3	1.38	1.34	2.84
1963	957	18.3	91.6	1.39	1.35	2.86
1964	980	18.7	93.2	1.41	1.37	2.91
1965	963	18.2	91.7	1.37	1.34	2.83
1966	946	17.8	90.5	1.34	1.30	2.76
1967	928	17.4	89.0	1.29	1.25	2.65
1968	914	17.0	87.7	1.25	1.21	2.57
1969	888	16.4	85.2	1.20	1.17	2.47
1970	872	16.1	83.6	1.16	1.13	2.40
1971	870	16.1	83.8	1.16	1.13	2.39
1972*	(810)	(15.0)	(78)	(1.08)	(1.05)	(2.25)

Source: Office of Population Censuses and Surveys.

\*Provisional.

123. However, not all women survive to age 45 and the net reproduction rate allows for the effect of mortality. It measures the average number of daughters that would be born to a group of newly-born girls if they were subjected for the first 45 years of their lives to the age-specific fertility and mortality rates of the year for which the rate is calculated. It is therefore a measure of the extent to which a generation of women subject to the fertility and mortality of a particular period would replace themselves by the next generation. A net reproduction rate of unity, if continued indefinitely, would in the long run result in a stationary population and could therefore be taken as 'replacement' fertility. At present British rates of mortality the net reproduction rate will be about  $2\frac{1}{2}\%$  lower than the gross reproduction rate, i.e. a gross reproduction rate of 1.025 is the equivalent of a net reproduction rate of 1.00.

124. The total period fertility rate takes account of both male and female births, and is computed in the same way as the gross reproduction rate. As about 106 boys are born for every 100 girls, it will be equal to about 2.06 times the gross reproduction rate. It therefore measures the average number of live-born children per woman which would result if the prevailing age-specific fertility rates were maintained over the whole 30 year reproductive span of

women's lives, and if there were no female mortality at all before the end of the reproductive period.

125. Table 9 shows that in 1955 with a general fertility rate of 74.1 the population would have increased by 5% in a generation (net reproduction rate—1.05). Fertility increased up to the peak year of 1964 when a rate of 93.2 would have led to a 37% increase in population a generation later, and the average number of births per woman would have been 2.9. (A generation is approximately 27–29 years.) Fertility has dropped sharply since 1964, but even after the big decline of 1972 the general fertility rate of 78 would result in a 5% increase in population a generation from now, with an average number of births per woman of some 2.25.

126. The measures shown are based on the experience of single years and they highlight transitory changes. Also they take no account of marriage patterns. For a better understanding of population growth an examination of the more fundamental and longer term factors underlying fertility is necessary.

## CHANGES IN FERTILITY PATTERNS

### **The technical problem**

127. In each of the last eight years the number of births has fallen, dropping from 980,000 in 1964 to an estimated 810,000 in 1972. (Table 9 gives the details). Over this period the gross reproduction rate has fallen by nearly one quarter. A decline of this magnitude and over this length of time is clearly very important and calls for careful analysis.

128. The fall in absolute terms was preceded by a more or less equivalent increase in the nine years up to 1964. This poses the question whether all we are seeing is a fluctuation with a period of 20 years or so. Clearly the high fertility of 1964 had no long term significance. Is the fertility of 1972 any more typical of what we may expect on average in the next 40 years?

129. Declining fertility trends have been wrongly interpreted on two previous occasions. First in the 1930s the prospect of an imminent decline in population was widely discussed, but in the event the population continued to increase. The figures were misinterpreted because the techniques of analysing population data were relatively undeveloped.

130. Second, the Royal Commission regarded the decline from the post-war peak of 1947 as a return to what they believed to be an underlying low level of fertility. This made them pay greater attention to the prospect of a long-term decline in population than to an increase. They concluded that there was 'good reason to be thankful that no further large increases in our population are probable.'<sup>1</sup> But again the early decline was soon reversed. (See Table 6).

---

<sup>1</sup> *Report of the Royal Commission on Population*, paragraph 638, Cmd. 7695 June 1949.

131. The importance of standing back from short-term interpretations of movements is clear and is further strengthened by the manner in which the surge upwards in annual rates from 1955 to 1964 led to projections of increases in population which are not now regarded as a reasonable basis for planning. Trends over short periods are a poor guide to longer-term prospects: in particular annual fertility rates can be a wholly misleading basis for making projections.

132. An alternative technique which has been developed in demography and applied mainly to fertility is that of cohort analysis. The fundamental objective is to follow through time the fertility experience of a given group of women, and to study the time pattern of their family building. We can define the technical term 'cohort' most easily by illustration. For example women born in 1930 form a birth cohort, those married in 1950 a marriage cohort. In studying fertility the childbearing experience of a given cohort is compared with the experience of earlier or later cohorts, both in the number of children they have and the ages at which they have them. In this way characteristic patterns of behaviour of different cohorts can be identified.

### **Cohort fertility patterns: generation fertility**

133. As a result of the Population (Statistics) Act 1938 information now exists covering more than 30 years. From this we can build up a series of estimates of the childbearing experience of successive cohorts of women. These estimates are summarised in Table 10. The column headed 1941-45, for instance, shows the total number of births per thousand women who were within the age range 15 to 19, the beginning of the childbearing period, averaged over the calendar period 1941 to 1945. The first figure in the column shows the number born to them when they were under 20 years old, the next when they were 20-24 years old, and so on.

134. Reading across the rows shows the trend in fertility for any individual age group. For instance the top row shows the fertility of women aged 15-19 in successive periods from 1926-30 to 1966-70. The next row shows the fertility of women of 20-24 years, but starting in 1931-35 when the first cohort considered was in that group. In the diagonals, running downwards to the left, can be read the fertility of the different age groups of women in a single five year period. Thus in 1946-50, which included the post-war baby boom, there was an average of 20 births a year for every thousand women aged 15-19 years, 132 per thousand women aged 20-24 years, 151 per thousand women of 25-29 years, and so on. (This series of figures is marked with asterisks; the arrangement of the table does not allow for the inclusion of the experience of women of 40-44 in those years.)

135. As far as the experience of the different cohorts is concerned the important features are the variations in their average number of children, and the differences in the ages at which they had their children. The first two columns relate to women who were born around the period of the first World War, and began childbearing during the Great Depression. The corresponding fertility rates are particularly low at the younger ages. However the low fertility of their early married life was to some extent made up later and by the end of their reproductive period they had gross reproduction rates of about 0.95.

TABLE 10  
Age-specific fertility rates for given cohorts of women

(Births per year per thousand women)

(Great Britain)

Age segment of life in years of age	Period when cohort started childbearing <sup>1</sup>								
	1926 - 30	1931 - 35	1936 - 40	1941 - 45	1946 - 50	1951 - 55	1956 - 60	1961 - 65	1966 - 70
15-19	(16)	(16)	(16)	16	20*	22	31	41†	49
20-24	(93)	(93)	102	132*	133	158	178†	161	(154)
25-29	(115)	122	151*	139	162	182†	162	(152)	
30-34	92	107*	89	96	105†	89	(79)		
35-39	58*	46	47	50†	41	(34)			
40-44	13	13	13†	10	(8)				
Total period fertility rate (average number of live births per woman)	1.94	1.98	2.09	2.22	2.35	2.44	(2.40)		
Gross reproduction rate of cohort	0.94	0.96	1.01	1.08	1.14	1.18	(1.17)		

Source: Office of Population Censuses and Surveys; General Register Office (Scotland).

<sup>1</sup> Childbearing ages conventionally are taken as 15-44 years (very few births occur outside these ages) but significant numbers of births start at 18 years rather than 15.

\*Post-war baby boom 1946-50.

†Peak period for births 1961-65.

Note: Figures in brackets are those for which partial evidence exists, though not covering the whole of the five year periods concerned. For the earlier cohorts the bracketed figures are those of the year 1938-39; fertility rates in the 1930s and the second half of the 1920s are thought to have remained fairly stable.

136. On the other hand women born in the later 1930s who entered childbearing in the first half of the 1950s had more children than their immediate predecessors and the gross reproduction rates for that cohort is an estimated 1.18. This is the result of high fertility rates at early ages; at later ages, particularly over age 35, their fertility is lower than that of earlier cohorts.

137. For women in the most recent cohorts we cannot yet estimate with confidence the total number of children they will finally have. The outcome will depend upon their fertility in the later stages of their childbearing period. If we study trends over time in age-specific fertility, i.e. if we consider the rows of the table, some general features emerge which help to predict the outcome for recent cohorts. During the post-war period there has been a marked increase in the fertility of the 15-19 age group. There has been a decline in the fertility of those over age 30, broken only by the effect of the post-war baby boom (shown in the first two columns) and the high fertility period of the first half of the 1960s. But within the most fertile ages, 20-29, fertility in the earlier years (20-24) has sometimes exceeded that in the later years (25-29), and at other times has fallen short. This leaves a wide margin of doubt about the outcome of the cohort of 1966-70, who at present are in their early 20s.

138. The gross reproduction rate as a completed cohort measure varied by approximately 25% from the low point of the pre-war cohort (around 0.95) to the post-war cohort of peak fertility (1.18); the calendar year rates during this period varied by some 60% from the low point of around 0.85 in the mid-1930s to about 1.4 in the early 1960s. This demonstrates the relative volatility of calendar year fertility.

139. If one cohort of women delays having children so that births which might otherwise have been spread fairly evenly over 10 years are concentrated into the later years of the decade—or vice versa—then comparisons of births in individual years will show fluctuations which would disappear if comparisons are made over a long period. Between 1961 and 1965 when births were very high, one cohort with a late fertility peak at age 25–29 coincided in time with the next cohort having their peak fertility between ages 20 and 24. If, however, women aged 25–29 were refraining from having children after bearing a comparatively large number of children during the previous five years while in the same period women aged 20–24 were deferring births, a low level of annual births would result. This provides a possible explanation of the recent sharp fall in births.

140. Special mention must be made of the decline in births in 1972, not only because this is the most recent information we have, but because the fall in 1972 was particularly sharp. Sooner or later—within say the next two or three years—there will have to be a recovery in annual births if women at present in the early stages of their childbearing period are to have a completed family size similar to that of the cohort nearing the end of their childbearing period. In our view, given present social attitudes there is nothing to suggest the imminence of a sharp fall in the family size, and accordingly we would expect a recovery in the future number of births.

141. There is, however, no way of predicting just when this up-turn will occur. It is possible that births may decline further before they start rising again. Obviously the further they fall, and the longer they stay at low levels, the more likely it is that average completed family size will fall short of that of the more recent past. Indeed in the short-term births could fall below replacement level for a time and yet leave average completed family size above replacement level. Fertility rates in 1972 were still at a level which, if continued unchanged, would lead to indefinite population growth. In our assessment of the prospects for future fertility we have not emphasised the fall in births or their level in 1972, because to do so would in our view be to over-react to a short-term movement.

142. It is not possible to estimate the completed fertility of any cohort of women with any confidence until they have reached the age of 30 or so, when on current patterns they will have had something like 80% of their children. It is the average number of births which women will have that is the important determinant for longer-term population growth, and the timing of these births is a secondary factor. Yet it is changes in timing which can be the major determinant of shorter-term trends in current fertility measures. This means that full understanding of fertility trends can only be established about 10 years after the event.

**Family size**

143. While it is the average number of births per woman which is the main determinant of the overall fertility of any generation it is important to consider how the averages are made up and how they change. The available information on this relates to numbers of births to different marriage cohorts. It is confined to first marriage and so excludes births outside marriage and births in second and subsequent marriages. The statistics do not therefore match exactly the coverage of Table 10.

144. Nevertheless the figures in Table 11 illustrate the main features of the decline in family size to the low point of the 1930s, and the increase in the post-war period.

**TABLE 11**

**Distribution of family size in Great Britain**

(Births occurring to first marriages)

(%)

Number of children live-born in marriage	Women married in period			
	1900-09	1920-24	1935-39	1955-59 (part estimated)
0	10	16	15	9
1	14	24	26	18
2	18	24	29	34
3	16	14	15	20
4	12	8	7	(11)
5 or more	30	14	8	(8)
	100	100	100	100
Average number of children	3.53	2.38	2.07	(2.38)

*Source:* Office of Population Censuses and Surveys.

145. There has been a large fall in the proportion of families of 5 or more children. Of marriages at the beginning of the century 3 in 10 resulted in 5 or more children whereas for marriages in the late 1950s it seems that fewer than 1 in 10 will result in 5 or more children. The proportion of both childless and one-child families increased sharply for women married in the inter-war years but has since fallen back.

146. The increase in overall fertility since the war has been due more than anything else to the reduced proportions of childless or one-child marriages: about 25-30% of marriages are now in this low fertility group compared with 40% in the inter-war period. Surveys into childbearing intentions suggest that about half of this low fertility is involuntary. In the post-war period, however, the proportion of marriages with three or four children has increased. The increase is small and as the fertility of these marriage cohorts is not yet

complete, there is a degree of uncertainty about the estimates, but nonetheless it is significant.

### Illegitimate births

147. Between the mid-1950s and mid-1960s, births outside marriage were increasing as well as those within marriage.

**TABLE 12**  
**Births outside marriage, 1951–1971**

(Thousands a year (% of all births in age-groups)) (Great Britain)

	1951–55	1956–60	1961–65	1966–70	1971
<i>Total</i> (% of all births)	36.4 (4.7)	41.2 (4.9)	63.8 (6.7)	74.4 (8.2)	72.7 (8.4)
<i>Age-group</i>					
Under 20	5.9 (17)	8.4 (17)	16.9 (21)	23.2 (25)	23.7 (26)
20–24	10.9 (5.0)	12.9 (5.1)	20.6 (6.9)	25.4 (7.9)	24.6 (7.8)
25 and over	19.6 (3.8)	19.9 (3.7)	26.3 (4.6)	25.8 (5.2)	24.4 (5.3)

*Source* : Office of Population Censuses and Surveys.

Table 12 shows that over the last 20 years illegitimate births have doubled from around 36,000 a year to 72,700 in the year 1971. Less than 1 in 20 of all births was illegitimate in the early 1950s whereas in 1971 the proportion was 1 in 12.

148. Since 1968 the proportion of illegitimate births has remained at about 8% of all births. Variations in the age structure of the population account for part of the fluctuation in numbers of illegitimate births, particularly the numbers of women under age 20 among whom the incidence of illegitimacy is now as high as one quarter.

149. Illegitimacy is not confined to the younger age groups. One-third of the total number of illegitimate births at present occur to women aged over 30. A considerable number of illegitimate births occur to stable unions, i.e. where there is a *de facto* if not a *de jure* family unit. Where an illegitimate birth is registered on the joint information of both parents the paternity is legally recorded. In 1971 there were over 30,000 of these, amounting to 45% of the total. In the same year some 13,000 births were re-registered as legitimated because of the subsequent marriage of the parents. Some 5,000 illegitimate children were adopted by one or both of the natural parents.

### Divorce

150. The rate of divorce has doubled over the last 10 years and there has been a considerable increase in the re-marriage of divorced persons. The

## *Population growth in Britain*

fertility of re-married women is at least as high as that of women of comparable age still continuing with their first marriage. The actual number of births occurring in 1971 to re-married women (including the small number previously widowed, as well as divorced) was some 21,000 compared with 18,000 a decade ago.

151. It has been suggested that increasing divorce may actually raise overall fertility because the new marriage produces a desire for more children and the creation of a new family. If the current trend in divorce rates leads to a position where perhaps 10–15% of recent marriages will be dissolved by divorce, the possible effect of the subsequent re-marriages on overall fertility patterns although marginal could be significant.

### **Trends in marriage patterns**

152. The numbers of illegitimate births and the number of births to women re-married after divorce are numerically of little importance when compared to births within first marriages. More women are marrying than ever before and they have their children earlier than they used to. About 90% of women can now expect to get married before the age of 30 and a further 5% to marry between age 30 and 45, the end of the childbearing period. Up to the 1930s fewer than 1 in 10 women married before they were 20 years old; by the early 1950s this had risen to nearly 2 in 10, and now about 3 in 10 marry before age 20. Before the war around 25% of all those aged 20–24 years were married: the figure now is approaching 60%.

153. Throughout the first 30 years of this century the average age at which women were married for the first time was about 25. During the last war this started to fall and by the first half of the 1950s it was 24.2 years. There was a further fall to an average of 22.5 years by 1970.

154. A fall in the average age at marriage in the post-war period of between 1½ and 2 years clearly indicates a major social change. It has almost certainly been a factor in larger families. It has undoubtedly contributed to the earlier pattern of childbearing which has reduced the average generation length by over 1½ years and possibly by as much as 2 years, estimating this for cohorts of as yet incomplete fertility.

155. In recent years there has been an exceptionally large surplus of men of marriageable age, a transitory result of the post-war baby boom. This has social implications which may affect the age patterns of marriage and blur the interpretation of current trends. While it is possible that the previous trend towards younger marriage has halted this may be transitory. There is as yet no evidence of a reversal to a pattern of later marriage.

156. In the past early marriage has been associated with considerably larger than average family sizes. Table 13, for women who married in 1955 illustrates this.

**TABLE 13****Average family sizes of women married in 1955**

(Great Britain)

Age at marriage	Under 20	20-24	25-29	All ages under 45
Average number of live births in marriage (estimates)	3.06	2.38	2.05	2.35

Source: Office of Population Censuses and Surveys.

Evidence building up through the 1960s suggests that there is now a narrowing of the previously large gap between the average family size of those marrying under age 20 and those marrying at age 20-24. This suggests a slightly lower overall average family size for the more recently married women even though they are continuing to marry at an early age.

### **The timing of births**

157. Generation length has been considerably reduced and earlier marriage was probably a cause of some, if not all, of this reduction. We are now faced with the possibility that couples of today who marry young and intend to complete a family of two, or even three, children could easily have them all before they are 25; or alternatively, remain childless to 25 and yet complete their families by age 30. This means that considerable attention will need to be paid in future to the influence of the timing of births on short-term changes in fertility rates. It will also be necessary to consider whether changes in timing will occur without affecting completed family size.

158. The information on birth spacing collected in the 1971 Census of Population will give more comprehensive material on this subject of a kind which has not been collected since the Family Census of 1946. A clearer picture will emerge about fertility changes in the post-war period. At present only fragmentary information on this subject is available in the form of statistics from birth registration particulars, though recent surveys have given some clues as to current patterns of birth spacing.

159. Reference has been made to a relative deferment in births as a possibly significant factor in the downward trend in overall fertility since 1965. While we cannot give a comprehensive picture until information from the 1971 Census is analysed, it is possible to pick out indicators of what may be a fairly widely based tendency to defer births.

160. Table 14 shows that just over half of those married in 1970 had had a child by their second wedding anniversary: the comparable figure some 10 years earlier was 59%. If we accept the information collected in recent surveys which suggest no increase in the proportion of women who will remain childless (some 10%) the figures in Table 14 can be taken to show a change in timing of the first birth.

**TABLE 14**  
**Proportion of women having a child within the**  
**first two years of marriage, 1951–1970**

(Great Britain)

Year of marriage	% having child within two years
1951	52
1956	56
1961	59
1966	56
1970 (part estimated)	51

*Source:* Office of Population Censuses and Surveys; General Register Office (Scotland).

### THE DETERMINANTS OF FERTILITY

#### Changing family size

161. Average family size has changed very considerably over the last 100 years. This has mainly been achieved by the more widespread use of birth control and the availability of more reliable methods of contraception.

162. It has been suggested that if modern contraceptive methods were universally and efficiently employed, so that people had no more children than they intended, the birth rate would be reduced to replacement level. As the following discussion of the factors affecting family size show, we see no reason why this should happen even though improved contraception will doubtless have some effect on the birth rate. Although trends in illegitimacy and divorce complicate the picture the overwhelming majority of births in this country take place to married women so our analysis will therefore be confined to them.

163. Researches in the USA have shown that the numbers of children that recently married women say they would like bear little relation to the numbers they actually have. For this reason we believe that statements about intended numbers of children must be treated with some degree of reserve. Where births take place to women who had previously stated that they had all the children they want it must be remembered that tastes and desires change and improved economic and social circumstances may lead to a wish for more children by one or both parents.

#### What determines family size?

164. Some people have families because they like children. Others because the urge to reproduce is deep rooted and widespread. Given that a couple decide that they want a family what determines the number of children they will have? Various factors have been suggested and we consider each in turn.

i. Religion

165. Studies in the United States suggest that religious affiliation has a considerable effect on fertility and that Roman Catholics generally have more children than those of other religious persuasions. Little information exists in Britain but results of surveys which included questions on religious affiliation suggest that Roman Catholics have an average completed family size about 0.5 children above that of non-Roman Catholics. The differential between non-Catholic and Catholic families is higher among non-manual workers than among manual workers.<sup>1</sup>

166. In general there is reason to think that over the years changes in the size of Roman Catholic families tend to follow those of the nation at large, as can be seen from Table 15.

TABLE 15  
Family size: Roman Catholic and other unbroken first marriages<sup>1</sup>

(Great Britain)

Year of marriage	Duration of marriage in years	Religion	No. of women	Average no. of live births at time of interview (1967-68)	Differences	
					Children	%
1941-50	17-26	Non RC	566	2.27	0.59	26
		RC	74	2.86		
1951-60	7-16	Non RC	503	2.10	0.45	22
		RC	118	2.55		
1961-65	2-6	Non RC	275	1.28	0.15	12
		RC	80	1.43		

Source: D. V. Glass: 1967-68 Population Investigation Committee's Survey of Fertility and Birth Control Practice (as yet unpublished).

<sup>1</sup> Excluding religion not stated.

ii. Social Class

167. The census uses the following broad categories of social class—

Class I	Professional and similar occupations
Class II	Intermediate occupations
Class III	Skilled occupations: i. non-manual ii. manual
Class IV	Partly skilled occupations
Class V	Unskilled occupations

168. Before the 1939-45 war fertility was lowest in Social Class I and reached its highest level in Social Class V. In the post-war period there has been a radical

<sup>1</sup> Ru-Chi Chou and Susanna Brown *A Comparison of the Size of Families of Roman Catholics and Non-Roman Catholics in Great Britain* Population Studies 22, 1st March 1968, pp. 51-60.

### *Population growth in Britain*

change. The 1951 and 1961 Censuses showed that fertility in Social Class I was higher than in Class II. Fertility was still highest in Social Class V.

169. Until the results of the 1971 Census become available we must rely on survey results for more up-to-date evidence, although these are based on rather small samples. They suggest that differentials in fertility may have narrowed, so that Social Class I patterns may no longer be very different from those of Class II. The fertility of Social Class V still appears to be significantly above the average, with family sizes of 2.6 or 2.7 compared with 2.2 or 2.3 in Social Classes I to IV.

#### *iii. Education*

170. The 1961 Census showed that fertility was highest in two groups, that in which education was completed at a very young age and that in which both parents were educated to beyond the age of 20; the majority of the latter would be graduates. This pattern is similar to that of social class. Until information from the 1971 Census becomes available we cannot tell whether this relationship has persisted. It is difficult to say what future trends might be. The increase in the proportion of girls in higher education might lead to a rise in fertility. On the other hand, an increase in general educational standards might reduce fertility in the lower social groups. Either possibility raises social issues which are outside our terms of reference.

#### *iv. Employment*

171. The widespread employment of married women in all social groups is a phenomenon which seems to be part of a long-term trend and not a passing fashion. The proportion of married women at work outside the home has increased from just under 10% in 1911 to about 40% today.

172. During the last fifty years there have been changes in the way of life of the majority of married women which have provided them with more time and energy for work outside the home. The general reduction in working hours and the availability of part-time employment has made it easier to combine outside employment with the running of a home. The position has not been eased for all women, however, particularly those in full-time employment. Fifty years ago many of them would have relied on paid help in the home but the combination of going out to work and running a home with little or no help often imposes heavy burdens. It is generally accepted that where women are employed in industry outside the home, increased female employment is associated with lower birth rates.

#### *v. Cost of children*

173. When considering whether or not to have an additional child a couple have to make a choice between different satisfactions. Those obtained from parenthood have to be weighed against those which might be obtained from spending the money on other things. The increased employment of married women outside the home means that the immediate economic sacrifice involved in having a child is greater than it used to be, as the mother's earnings have to

be forgone, at least during the later stages of pregnancy and the early period of a child's life.

174. There is little statistical evidence available about the cost of children. A certain amount of work is being carried out on this but results are not yet available. The cost of the first child is the greatest, and the costs of subsequent children are less, depending upon such things as the interval between births and the sex of the child.

175. Many hold that our present system is pro-natalist and cite as examples: income tax relief for children, family allowances, maternity benefits, free education, free medical and dental treatment for children, family income supplement and so on. It is claimed that this range of government policies have the effect of reducing the costs of children and fostering a climate of opinion generally favourable to childbearing.

176. Although the effect, if not the purpose, of many of these policies is to reduce the cost of children, their overall impact is limited. Income tax allowances, maternity allowances, family allowances and family income supplement do not compensate for the full costs of rearing children. We cannot take seriously the suggestion which is often made, that people in this country have children because of the financial benefits they will derive from them.

177. When we look at some of the differences in fertility in this country in the past it seems that income may not have been a decisive factor in influencing family size. There is no simple relationship between income and fertility. As income rises though couples can afford to have more children, it is possible that their relative cost will rise as conventional needs increase. There are no simple or clear cut conclusions to be drawn. It may be that the net result of a higher income is fewer children.

#### *vi. Housing*

178. It is possible that the level of provision of housing affects fertility. The one area where there is clear evidence for this is in Eastern Europe. Some people think that childbearing is often delayed by housing difficulties and even that eventual family size may be affected. It is possible that as the housing situation improves fertility will rise.

#### *vii. Concern about population*

179. It has also been suggested that the recent concern about population growth may result in some couples voluntarily restricting their families to a size not greater than is needed for replacement. Hitherto there has not been much evidence to suggest that many people have been influenced in this way. In the 1930s for example, when concern was expressed about an incipient decline in numbers in many European countries, family size was not affected by pro-natalist propaganda. We do not know what the effect of today's concern may be for the future population.

*viii. Other factors*

180. It may be that there are other factors which play an important part in determining family size. Fashion or changes in attitudes in society are likely to have an important influence although it is difficult to see how this influence can be measured.

**Future family size**

181. On looking at the part played by religion, social class, education, employment, cost of children, housing and concern about population it is clear that our analysis does not yield much information that would be useful in assessing future trends. There are many factors influencing fertility and at different times one factor may well assume greater importance than others.

182. Fertility in this country is already fairly low. Large families are becoming rare and families of more than three children are less frequent. Having a third child may not seem very significant for an individual family and may not involve great additional sacrifices either of time or of money. If it took place on a large scale, it could significantly affect the growth rate of the population.

183. If family size at 10 years' duration of marriage is taken as an index of fertility, there has been no sign of any major reduction. Couples who have now been married for 10 years were married in the early 1960s, when births were numerous. Family size achieved at earlier stages in marriage has declined a little in the last few years, but this may be little more than a change in birth spacing. We shall not be certain about its significance for some years.

184. Surveys show that women married in the second half of the 1960s declared their intention of having families of a size which average out at a little over replacement level, and that they wished to complete their families not much later than at age 30. Despite these declarations it is quite possible that social and economic factors may lead them to add to their families during the next decade.

185. Evidence is needed as to the extent to which the timing of first births may be deferred or brought forward by parents in different circumstances, and the social and economic factors influencing this. We also need to know whether the present tendency to relatively rapid completion of the family once the first child is born will persist, or whether birth intervals will be independently subject to shortening or lengthening.

186. We see no significant movement in society at present making for an average completed family size below replacement level: indeed it is likely to remain somewhat above it. Even if fertility rates fell below replacement level and remained below it for several years, completed family size need not follow, even temporarily.

## POPULATION PROJECTIONS

### Population models

187. The analysis of fertility and mortality patterns and trends leads to the question of what they might point to in the way of change in the population of this country. Policy must be based on some assessment of the future and for such purposes population projections are used. Such projections require assumptions about fertility, mortality and migration.

188. Clearly at any one point in time current fertility rates are a poor guide to completed family size for families only recently started. The fertility of succeeding age groups of women can vary quite substantially and the reasons for variations are not clear. But it is important to remember that even if we fully understood the determinants of recent changes in fertility this would give no certainty in predicting the future.

189. Population projections stretching forty and more years ahead, depending almost wholly in the longer run on assumptions about future fertility, are essentially speculative. They should be regarded as population models illustrating the consequences for the size and structure of the population of different assumptions about fertility and mortality. Our need has been to test the implications of variants of the basic fertility assumption so that the different resulting rates of change in population size and structure can be discussed and evaluated.

190. In this kind of evaluation process we cannot stray too far outside previous experience. If we do so we move into areas of speculation so remote from present experience and the present social structure that we have little understanding of the relevance of the results to our present situation. For our purposes the need has been therefore to define fertility variants which are themselves not implausible, but wide enough apart for the resulting population models to diverge sufficiently from each other over the period with which we are concerned. They then provide a quantitative basis for the evaluation of economic and social costs and benefits of a faster or a slower growing population.

### The 1970 based models

191. At the beginning of the Panel's work, we sent to a number of Government Departments three different models of future population change in Great Britain, asking them to help us in assessing their significance for the periods 15 years and 40 years ahead. The Departments were provided with quickly prepared models based on 1970 population. These have since been updated as the first results of the 1971 Census of Population became available. But the replies of the Departments have not been invalidated by the revisions. It is the more up-to-date results of population projections from 1971 to 2011 which are presented and discussed here.

### 1971 based models

192. The medium or central fertility model assumes that fertility over the

## *Population growth in Britain*

whole 40 year period remains at the 1971 level, a gross reproduction rate of 1.16. Given present rates of mortality this would mean that population size would in the long run increase at 13% per generation of about 27 years. With an assumed gradual decline in mortality, as in the Government Actuary's official projection, the rate of growth would tend to rise to about 14% per generation.

193. The low fertility model assumes that fertility will decline by about  $2\frac{1}{2}\%$  a year until 1977 to reach approximately replacement level, a gross reproduction rate of 1.02 and a net reproduction rate of 1.0. Replacement fertility is sometimes represented as in some sense a 'natural' level. But fertility significantly above replacement level has been a strong feature of the post-war period and our analysis suggests that it may be deeply entrenched in present society. Against this background it does not seem that replacement fertility can be picked out as more 'natural' than present patterns. Instead, as a fertility rate of just below replacement level was, however briefly, the historical minimum experienced in this country, it could claim a place in forward assumptions on this ground alone.

194. The high model assumes that fertility will rise for ten years to reach in 1981 a gross reproduction rate of 1.37, the average fertility of the period 1961 to 1965. It may be worth noting that although we now call this a high model, it assumes a fertility significantly lower than that in the USA in the early 1960s.

195. All the models are on a natural increase basis, making no provision for migration. A simple way of presenting this is to say that they depict a strictly closed society. It could also mean that equal numbers of individuals emigrate and immigrate each year, with identical demographic characteristics such as sex, age, marital status, fertility, mortality: there would then be no net effect on population either direct or indirect. The extent to which migration modifies natural increase models lies in the size of the inward and outward streams and the extent to which they differ in composition from each other. As long as net migration is a relatively small element in population change, natural increase models at least over the medium term will not differ much from models which allow for migration and its effect.

196. Broad results of the three models are given in the Table 16.

**TABLE 16**  
**Population models for Great Britain, 1971–2011**

(Natural increase models, no allowance for migration)

	Model I—Low		Model II—Medium		Model III—High	
	Millions	% Increase per decade	Millions	% Increase per decade	Millions	% Increase per decade
1971	54.1		54.1		54.1	
1981	55.6	2.8	56.4	4.1	57.2	5.6
1991	57.3	3.0	59.2	4.9	61.7	7.9
2001	59.0	3.0	62.3	5.4	67.1	8.8
2011	60.7	2.9	66.1	6.0	74.3	10.7

Source: Office of Population Censuses and Surveys.

If fertility remained unchanged at the 1971 level, then, excluding any allowance for future migration, total population would have grown by 12 million to 66 million by 2011. If fertility were to come down to replacement level, the population by 2011 would have grown by some 5 million less; while if it rose as assumed in the high model based on the 1960-65 fertility the population would have grown by 8 million more.

197. The reason why the population is bound to increase even on the replacement (low) model is of importance. Over the next fifteen years the number of women of younger childbearing age in the population, those aged 15-30 years, will increase by about 12%. These women have already been born and very few of them are likely to die before age 30, by which time, if present habits continue, they will have borne most of their children. In the low model the 12% drop assumed in overall fertility rates by 1977 approximately offsets the increase in the numbers of women of the main childbearing ages. The result is that births in the low model at first drop below the 1971 level of 870,000 to 790,000 a year in the mid-1970s, but increase again to vary around 840,000 a year from 1986 to 2011.

198. Numbers of deaths will increase in the longer run as the population structure shifts towards the older ages, but the main effect will occur after 2011. Deaths will vary in the range 640,000-680,000 throughout the period up to 2011, and will therefore be considerably less than births even for the low model, over the next 40 years. Natural increase in the population will still be about 170,000 a year at the beginning of the next century on the low fertility model, though beginning to diminish sharply.

199. The age structure of the population on the basis of the three models is shown in Table 17.

**TABLE 17**  
**Age distribution of model populations, 2011**

(Great Britain)

	1971 actual	Model I—Low	Model II—Medium	Model III—High
Millions				
Under 15	13.0	12.3	15.2	20.0
15-44	21.1	24.6	27.1	30.6
45-59/64*	11.3	13.6	13.6	13.6
60/65* and over	8.7	10.2	10.2	10.2
	54.1	60.7	66.1	74.3
Per cent				
Under 15	24.1	20.4	23.1	26.8
15-44	38.9	40.5	41.0	41.2
45-59/64*	21.0	22.4	20.6	18.3
60/65* and over	16.1	16.7	15.4	13.7
	100	100	100	100

Source: Office of Population Censuses and Surveys.

\*45-59  
60 and over } Women      45-64  
65 and over } Men

## Population growth in Britain

The low model gives proportionately fewer children and more old people in the population than the medium model, vice versa for the high model. In 2011 the overall dependency ratios, the number of those under age 15 plus those over retirement age for every 1,000 people of between 15 and retirement age, is 590 for the low model and 681 for the high. The differences in the actual numbers of children between the high and the low model are substantial, at 8 million.

200. It is clear that whatever the growth of population over the coming 40 years the age structure must be expected to change in some degree, as can be seen by comparing the medium model with the 1971 figures. For the high and low models the differences from the medium model appear to be marginal in terms of the structure of the population, as distinct from the absolute figures. As Table 5 shows, considerable variations in age structure have occurred in the past and by historical standards none of the models for 2011 present unprecedented features.

## Replacement fertility and family size

201. The patterns of family sizes which are consistent with replacement fertility, that is an average family size of 2·1 children, are of considerable interest. Two possible examples of such patterns are given in Table 18 and compared with the figures for two historical groups of families. Strictly speaking, replacement level fertility (or a net reproduction rate of 1·0) means an average number of live born children per woman (at the prevailing mortality rates) of 2·11. The average number of children per family will depend upon the proportion of women who marry, and the proportion of births occurring within marriage. However, there is not much difference between the figures and in broad terms we can talk of 2·1 as the average family size implied by the low fertility model.

TABLE 18

### Two models of family size consistent with replacement level fertility

% of all families

Number of children in family	A	B	Families of couples married in	
			1935-39	1955-59 (part estimated)
0	10	10	15	9
1	20	15	26	18
2	35	30	29	34
3	20	45	15	20
4	15	—	15*	19*
Average family size	2·1	2·1	2·07	2·38

Source: Population Panel.

\* Four or more (some 8% of all families had 5 or more children).

202. In Table 18, A and B show that widely different family size patterns are possible even when the population in the longer run is simply replacing itself and not expanding. In A, 35% of families have 3 or 4 children; in B,

45% have 3 children. In A, the proportion of two-child families is greater, reflecting the pattern of the 1955-59 cohort rather than that of 1935-39. In B, three-child families are the most numerous and none consist of four or more children. A and B differ from the 1955-59 cohort in having fewer large families.

203. We do not intend to suggest that larger families have to be prevented for the population to reach replacement level fertility. On the contrary, replacement level fertility can be consistent with a substantial proportion of families having 3, 4 or even more children. In fact the situations in A and B are obviously very simplified ones; it would be possible for a small proportion of families to consist of 5 and more children while the overall average of 2.1 children is maintained. The important point is that replacement level fertility does not imply that two is the maximum size of family.

### **A very low fertility model**

204. In order to explore prospects of population growth yet further we have considered to what level fertility would have to fall to offset the growth latent in the present population structure, and prevent any growth at all. Deaths over the 1970s are expected to be around 650,000 a year, so fertility must fall to match that figure by 1980 (or before).

205. A very low model which roughly fits the case is one where the gross reproduction rate falls to 0.77 by the end of the 1970s, a rate of fall in fertility over this period of 5% a year. This would imply an average of about 1.6 births per woman from now on. A hypothetical example of family size approximating to this case is shown in Table 19.

**TABLE 19**  
**Family size distribution: very low fertility model**

No. of children in family	% of all families
0	15
1	30
2	40
3	10
4	5
Average family size	1.6

*Source:* Population Panel.

206. This example represents a return to the high proportion of childless and one-child families which characterised the 1930s, and a halving of the proportion of families with three or more children (pre-war some 30% of families had 3 or more children as compared with nearer 40% of the post-war cohort of peak fertility). In both these respects the example departs radically from recent fertility experience.

207. A fertility rate as far below replacement level as in this particular model would be needed to prevent the overall population size from increasing materially in the shorter term, but it would also lead to a faster rate of

## *Population growth in Britain*

population decline by the end of the 40 year period we are considering. Table 20 shows what is implied by this very low model beyond 2011, up to the middle of the next century.

**TABLE 20**  
**Population 1971–2051: very low fertility model**  
(Great Britain)

Year	Millions
1971	54.1
1991	54.3
2011	52.3
2031	47.2
2051	39.0

*Source:* Office of Population Censuses and Surveys.

208. Population decline at this rate, if due to a fall in fertility as assumed in paragraph 204, would lead to an unprecedented change in the age distribution. Table 21 illustrates the comparison at 40 year intervals.

**TABLE 21**  
**Age distribution 1971–2051: very low fertility model**  
(Great Britain)

Age	1971 (actual)	2011	2051		
				Millions	Per cent
under 15	13.0	8.1	5.4		
15–44	21.1	20.5	13.5		
45–59/64 <sup>1</sup>	11.3	13.6	9.7		
60/65 + <sup>1</sup>	8.7	10.2	10.4		
	54.1	52.3	39.0		
under 15	24.1	15.4	13.8		
15–44	38.9	39.2	34.6		
45–59/64 <sup>1</sup>	21.0	26.0	24.9		
60/65 + <sup>1</sup>	16.1	19.4	26.8		
	100	100	100		

*Source:* Office of Population Censuses and Surveys.

<sup>1</sup> See footnote to Table 17.

The table shows that on the very low population model 26.8% of the population would be over the present retirement age by the middle of the next century, an unprecedentedly high proportion.

209. The results of mechanically extending this model forward to the year 2051 are here put forward to allow study of the implications of the kind of age structure that goes with a rapid decline in population brought about by low fertility. If any particular 'target' population were to be the aim, at some time or other fertility would have to recover to replacement level in order first to slow down the rate of decline, and ultimately to allow total population size to approach the 'target' stabilisation level. We have not concerned ourselves with the problem of engineering fertility assumptions to achieve any given 'target' size of population. The particular model put forward here however can be used to pose the question of whether a population with the rate of decline and the age structure shown in Table 21 could be accepted as desirable in itself.

### **The length of generations**

210. Instead of altering levels of fertility there is the possibility of changes in the length of generations which also affect the rate of population growth. The net effect of the post-war trend to earlier marriage and a slight move to having children earlier in a marriage is to hasten the march of generations. If these changes were reversed then the population growth-rate would be slower.

211. The three models that we have used assume a generation length of 27 years and produce populations of 61 to 74 million in 2011. If the generation length were extended by two years the population would be respectively  $\frac{1}{2}$  to 1 million lower in 2011, though the gap would be widening somewhat as time went on. In other words the effect of extending the generation length is merely to slow down slightly the rate of growth.



## CHAPTER 3

### IMPLICATIONS OF POPULATION GROWTH OVER THE NEXT FORTY YEARS

	Paragraph	Page
Limitations of our analysis .. . . . .	212	59
<b>Population Growth and Output Growth</b> .. . . . .	213	59
Labour input .. . . . .	215	59
Unemployment .. . . . .	223	61
The growth of productivity .. . . . .	227	62
Population and productivity .. . . . .	232	63
Areas of rising costs .. . . . .	236	64
i. Agriculture .. . . . .	237	64
ii. Water .. . . . .	240	65
iii. Sewage .. . . . .	243	66
iv. Transport .. . . . .	244	66
Implications for output and productivity .. . . . .	247	67
<b>Population Growth and the Standard of Living</b> .. . . . .	250	68
Investment .. . . . .	256	69
Public consumption .. . . . .	267	71
Some measures of welfare .. . . . .	276	73
The effect of varying the basic assumptions .. . . . .	290	77
Advantages of slow population growth .. . . . .	292	78
<b>The Impact on Land</b> .. . . . .	296	79
Land and population distribution .. . . . .	301	80
Urban land .. . . . .	305	80
The availability of land .. . . . .	312	84
Agricultural land .. . . . .	323	85
The countryside as an amenity .. . . . .	324	86
<b>Some Social Implications of Population Growth</b> .. . . . .	331	87
Towns and cities .. . . . .	332	87
Noise .. . . . .	334	88
Pollution .. . . . .	335	88
Overcrowding and malnutrition .. . . . .	339	89
Epidemic disease .. . . . .	340	89
Stress .. . . . .	342	89
Social malaise .. . . . .	348	90
Rules, regulations and administration .. . . . .	352	92



## CHAPTER 3

### IMPLICATIONS OF POPULATION GROWTH OVER THE NEXT FORTY YEARS

#### Limitations of our analysis

212. In this chapter we consider the implications of population growth in Britain over the next 40 years. We assume that present economic systems will continue throughout this period so that trade is always possible and resources available even if at a high price. We use the three population models described in chapter 2 and evidence from Government Departments. Statements about trends in the next 40 years should not be taken as applying after that date. We consider the position beyond that date in the next chapter.

#### POPULATION GROWTH AND OUTPUT GROWTH

213. We have tried to estimate the likely effect on the average standard of living of different rates of population growth. We consider here material welfare, narrowly conceived, as measured in terms of consumption of the goods and services that form part of the national product. Material welfare is not the only factor in social well-being; some other important considerations are discussed later in this chapter.

214. The first step in our investigation is to judge how the growth of population affects the growth of total output. We do this on the basis of estimates of the total number of hours likely to be worked and the likely annual rate of increase in productivity—the output produced by an hour's work. Insofar as total output is in question this seems the appropriate procedure, but we had to bear in mind the possibility that there might be particular kinds of output, important to our welfare, that it might be specially difficult or costly to increase. Agriculture, water supplies, sewage disposal and transport services are sometimes regarded as falling within this category and are a cause of public concern, so we gave them special consideration.

#### Labour input

215. Table 17 (chapter 2) shows that the age distribution of the population in 2011 varies between population models and will certainly be different from that of 1971. Consequently the available labour force will not form a constant proportion of the population. The dependency ratio (the number of children and people of retirement age per thousand people of working age) will differ accordingly. In 2011 it will be considerably higher if population grows according to the fast rather than the slow growth rate assumption, 728 compared with 626.<sup>1</sup> Eventually this difference will narrow as the proportion of old people in the fast growth model falls, but this may take another generation.

216. To estimate the contribution that an increased labour force may make towards the growth of output we need to consider not only how many people are of working age but how many will in fact be offering themselves for work.

<sup>1</sup> These figures assume that compulsory school attendance will end at the sixteenth birthday.

This means making allowance for those of working age who for one reason or another are not seeking work, as well as for those over retirement age who continue to work. We have assumed that the age of retirement remains as at present, but that the proportion of people still working after retirement age continues to decline. We have also allowed for a growing number of young people continuing their education after the minimum school leaving age. For the rest we have projected recent trends in 'activity rates'—the proportion of people in each age group who are in the labour force.

217. We are here concerned mainly with women's activity rates because the activity rates of men of working age are very close to 100%. Women's activity rates have been rising steadily and we have assumed that this rise will continue for some 15 years and then level off. We used the same assumptions about activity rates in all three population growth models. On this basis, since anyone who would be of working age in 1986 was already born in 1971, the labour force in that year is not affected by variations in the growth of population. But in 2011 there is a difference of 13% in the labour force estimates between the slow growth and the fast growth models. This is a substantial difference, though much smaller than that in total population which amounts to 22%.

218. We had some doubts about the validity of using the same activity rate assumptions for all three growth models. We are inclined to believe that if women have larger families, as in the faster growth model, they are likely to be out of the labour force caring for young children for longer. There is no reason to suppose that a reduction in the intervals between births would take place and offset this. But there could be other factors working in the opposite direction; there might, for instance, be a stronger demand for female labour for schools and hospitals in a society with a higher proportion of children in the population. Our basic assumption, that the activity rate is the same for each model, assumes that none of the factors mentioned above are present.

219. We did, however, examine the effect of an alternative assumption, that the number of women not at work and aged over 45 varied with the number of children in the population. The effect was to increase the number of working women by about 5% in the slow growth case and reduce it by about 8% in the fast growth case, compared with the basic assumption of equal activity rates for all three models. The total labour force increased by between  $1\frac{1}{2}$  and 2% in the slow growth rate case, and fell 3% in the fast growth rate case.

220. The basic estimates of the growth of the labour force are still not adequate for projecting the contribution of labour to output. During the next 40 years we expect both a reduction in the length of the working week and an extension in the length of annual holidays. To arrive at estimates of labour input we have assumed, quite arbitrarily, that there will be a gradual reduction in average hours worked per week amounting to 20% over 40 years, and a gradual extension of holidays amounting to an increase on average of a fortnight a year. Combining these figures with the projections of the growth in the labour force gives us estimates of the change in average hours worked per year.

221. It will be noticed that we have made no specific adjustment for the change in the composition of the labour force. It might be thought that the increase in the proportion of women would tend to reduce the average hours

worked. This can, however, be assumed to be taken into account in the assumption of a gradual reduction in hours worked per head, and the proportion of women in the labour force in 2011 is not significantly different between the three models.<sup>1</sup>

222. The estimates of total labour input, on our basic assumption, are set out in Table 22. For the central model, population grows by 22% by 2011 and the labour force by 28%; with a fall of about one-quarter in average hours worked a year the total labour input available in 2011 is expected to be a little less than in 1971. The slower and faster growth models imply populations in 2011 around 10–13% smaller or larger than in the central case; these margins are reduced to 5–8% for labour force and total labour input. If however allowance is made for the effect of the larger number of children on the number of women seeking work, as discussed in paragraph 218, the spread in labour input between the slow growth and fast growth models is reduced from 12% to 7%.<sup>2</sup>

**TABLE 22**  
**Population growth and labour input, 1971 to 2011**

	1971	2011			2011		
		I (low)	II (medium)	III (high)	I (low)	II (medium)	III (high)
		1971 = 100			Model I = 100		
1. Population (millions)	100 (54)	112 (61)	122 (66)	137 (74)	100	109	122
2. Working population or labour force	100	121	128	136	100	105	113
3. Average hours worked per year	100	76	76	76	100	100	100
4. Total hours worked per year ( $2 \times 3$ ) or total labour input	100	92	97	103	100	105	113

Source: Population Panel.

### Unemployment

223. There is of course a difference between the size of the labour force, which is what we have estimated, and the number of people employed. If we

<sup>1</sup> They will, however, have more children to look after in the faster growth model and this might tend to reduce average hours worked. We have made no estimate of the possible size of such an effect, but it would no doubt be smaller than the effect of assuming a reduction in female activity rates in the faster growth case which we estimated in paragraph 219.

<sup>2</sup> Estimates of the size of the labour force in 1986, and corresponding estimates of output, are not shown here because differences in births can have no effect on the population of working age in that year, nor on the size of the labour force on our central assumption of the same activity rates for all models. It should be noted however, that if we assume that more children means fewer women at work as in paragraph 219 there could be 12% fewer women at work in 1986 in the faster growth case and the total labour force would be 4% smaller than in the slow growth case.

## *The next forty years*

assume that the employed labour force changes between 1971 and 2011 in the same way as the total labour force we are in effect assuming that the unemployment rate remains at the 1971 level. It might be reasonable to hope that in the long term it would be reduced, but the scope for a further increase in total labour input for this reason is small and would presumably be much the same for all the population models. We have therefore assumed a constant unemployment rate throughout.

224. It has sometimes been maintained that there are reasons for expecting unemployment to increase. On the one hand technological change, often summed up in the word 'automation', may reduce the demand for labour. On the other hand with a faster growing working population the supply of labour will be increased. In these circumstances there might be a difference in the unemployment rate between our three population models which, even if its effect on output were relatively small, could have a significant effect on general social wellbeing.

225. We see no justification for these views. Unemployment is chiefly due either to a deficiency of demand, perhaps the result of a decision to restrict demand as a means of controlling inflation or curbing a deficit on the balance of payments, or to a temporary discrepancy between the type of labour demanded and the labour force available. The first of these circumstances is a problem for economic management and this should be no more difficult with a larger or faster growing population. The second form of unemployment may arise from technological change, shifts in the structure of demand, or foreign competition. None of these factors is likely to be affected by variations in the size or rate of growth of population.

226. There will no doubt be considerable problems of adjustment associated with structural and technological change during the next 40 years. Such adjustments might be easier to make with a faster growing, and therefore younger, labour force and a similarly younger stock of capital equipment. But it should be possible to make these adjustments in all cases, and we see no reason to assume different unemployment rates in our three models. We have assumed that for each model the growth in the number employed is the same as the growth of the labour force as set out in Table 22.

## **The growth of productivity**

227. Whereas we project labour input in terms of man-hours to change very little over the next 40 years, total output may be expected, on the basis of recent trends, to increase considerably in the same period to a level some three times that of today. This estimate depends largely on the projected growth of productivity, that is, output per man-hour.

228. Projections of output per man-hour must necessarily be based on a review of past trends. Since the war there have been annual estimates of the volume of output from which estimates of the underlying rate of growth of output per head or output per man-hour can be obtained. The rate of growth of productivity seems to have increased during the 1960s and at least one

estimate puts it as around 3% currently.<sup>1</sup> We have therefore to consider whether this sort of rate of increase can reasonably be used in our projections.

229. According to a recent OECD Report,<sup>2</sup>

'There is nothing, in logic or experience, to contradict the idea that in a country where, during the later stages of the industrialisation process, high rates of growth of productivity have been achieved, and where, as a condition and consequence of this, the whole of the economy is adapted to such rates in terms of high investment ratios, expectations of firms and consumers, attitudes in respect of innovation, rates of expansion of public expenditures, etc., these rates may persist irrespective of the level of income attained. In other words, there may well be a considerable "growth inertia" for a country over a particular historical period'.

On the basis of these considerations it seems reasonable to assume the continuation of the current productivity growth rate of some 3% a year for the next 10 or 15 years.

230. We must then consider whether it is safe to project such a trend into the further future. One might recommend the assumption of a lower trend growth rate arguing that the pace of technological change might slacken and productivity gains diminish. There is, however, no evidence of any such development at the moment. In any case we start from a position where levels of productivity in the United Kingdom are below those achieved in some European countries and only about half those of the United States. In none of these countries could it be said that the scope for further exploitation of technology has been exhausted. The United Kingdom might reach the present productivity level of the United States in, say, 20 years time and even then there would still be great scope for further advance.

231. We have considered other reasons why the rate of increase in productivity might vary in either direction, but found none of them decisive. We have therefore adopted the assumption of continued growth in output per man-hour at 3% a year. We are not much concerned about the possibility of error in this assumption, for we find later on in this chapter that the relative economic advantages of faster or slower population growth are little affected if we vary the productivity growth assumption.

### **Population and productivity**

232. A more pertinent question is whether productivity growth is itself affected by variations in the rate of population growth. Some economists have given reasons for expecting that an expanding population might favour productivity. A growing work-force will be younger, and it is argued more adaptable and better trained. In much the same way there will be a larger proportion of relatively new capital equipment incorporating recent technological advances. Structural change might also take place more easily; expanding sectors can draw on the additional labour supply coming forward

<sup>1</sup> *Treasury Memorandum: Appendix 1 of the Seventh Report from the Expenditure Committee.* Session 1971–72 House of Commons Paper 450.

<sup>2</sup> *The Growth of Output 1960–80*, OECD December 1970.

## *The next forty years*

while the need for absolute contraction in other sectors will be less. Moreover it has been suggested that rising numbers would engender business confidence in the expansion of demand and thereby promote investment and permit the exploitation of additional economies of scale.

233. Although these considerations must be given weight, there are others to set against them. A younger labour force may be more inexperienced. A faster-growing population needs more housing, schools and other social and industrial capital, and a larger proportion of output needs to be devoted to investment than in the case of a slower growing population if similar standards are to be attained. But with a larger proportion of output going to investment, less is available for consumption. If consumption is in fact preferred to investment and sufficient capital is not provided, the rate of growth of productivity would not be so fast as in the case of the slower-growing population.

234. If there are small differences between the three models as far as the rate of growth of productivity is concerned they could be of importance. A difference in growth rates of 0·1% a year amounts to nearly 5% in 40 years, and a difference of 0·5 % a year amounts to 25%. Taking all considerations into account we found it difficult to decide on either the size or the direction of any effect. People who have tried to estimate the effect of population growth on productivity have found it to be very small.

235. We concluded therefore that the differences in the rate of population growth between our three models were too small for them to have any marked effect on the growth of productivity and that it would be reasonable to assume the same rate of productivity growth in each case.<sup>1</sup>

### **Areas of rising costs**

236. We have so far made no specific reference to the effect on productivity or costs that might be expected from the increased demands made upon resources in more or less fixed supply. The land area of the country is fixed but there will be increasing demands for more urban development and recreational areas at the expense of land for agriculture. With less land the costs of a given volume of output of foodstuffs would presumably be higher. Similarly the amount of water falling on these islands is virtually fixed; the more of us there are, the less there will be for each and the less natural facilities there will be for diluting, purifying and carrying away our wastes in rivers. So costs of water supply might also increase. Finally, as transport needs rise, unit costs may increase more than proportionately. These possibilities have been the subject of public concern and we consider them individually.

#### *i. Agriculture*

237. From the detailed consideration of the demand for land (see paragraphs 296 to 330) we find that the increase in land required for urban uses over the next 40 years varies from an annual average of 35,000 acres in the case of a

<sup>1</sup> For a more technical development of some of these issues, largely in the context of developing countries, see A. P. Thirlwall, *A Cross Section Study of Population Growth and the Growth of Output and Per Capita Income in a Production Function Framework* Manchester School of Economic and Social Studies, December 1972.

slow-growing population to 70,000 acres for a fast-growing population. Most of this land will have to come from agriculture but even allowing for differences in quality the areas needed are small compared with the present available acreage of 30 million, excluding rough grazing. Although theoretically there must be some effect on costs of having only a fixed amount of land, it must be very small indeed in practice.

238. In recent years British self-sufficiency in indigenous foodstuffs has increased,<sup>1</sup> and we now produce nearly two-thirds of our needs. Agricultural output has risen by some 60% in the last 20 years. It is expected to continue to rise (though not necessarily at the same rate) in the future, given the present discrepancy between the average and best practice, and the scope for further improvements.<sup>2</sup> This would be accompanied by a considerable reduction in labour and other costs per unit of output. The level of self-sufficiency could therefore increase further, despite the growth in population (at least that of Models I and II), the increase in demand for the more expensive foods, such as meat and dairy products, and the expected inroads of urban development into agricultural land.

239. We have considered suggestions that the increase in agricultural output will soon come to a stop for a number of technical reasons, such as deterioration in soil quality through continuous arable working and lack of organic manure, the deleterious effects of increased use of artificial fertilisers and diminishing returns from them, the growth of resistance to pesticides and the weakening of plant resistance to disease as a result of breeding policy. There are dangers in all these (though experience indicates that some soils can be kept in long term arable use without deterioration in yields) but none of them seem likely to present difficulties which cannot be overcome by means which either are already available, or are expected to become available before long.

## *ii. Water*

240. We use, domestically and industrially, only a small proportion of the water available from the total annual rainfall, and our many unused or only partially used sources of water could be backed up, at a price, by the immense reserves of the sea. Water consumption will certainly continue to rise and consumption per head could well be double the present level by 2011, but there is no problem of a physical shortage of water in the foreseeable future, even if the population expands at the fastest rate we have considered.

241. It is nevertheless possible that the cost of meeting the water needs of the population in 2011 might be disproportionately higher with a population of 74 million than with one of 61 million. The present cost of water supplies for all purposes is very modest, averaging only £4 per head a year. Even the cost of water from a newly developed source is estimated at very little more if modern methods are employed.

<sup>1</sup> L. J. Angel *Measuring self-sufficiency for food and drink in the United Kingdom*, Economic Trends, November 1971.

<sup>2</sup> See G. W. Cooke *The Carrying Capacity of the Land in the Year 2000* in *The Optimum Population for Britain* edited by L. R. Taylor.

## *The next forty years*

242. The cost of supplying water in particular areas such as the south east seems likely to grow as demand increases and more expensive local sources of water have to be exploited, or water has to be brought from the north and west where it is more plentiful. Even so the water engineers of the Water Resources Board and the Department of the Environment do not consider that the cost of supply per head over the country as a whole should rise seriously; the extent of the increase will depend to a considerable extent on the distribution of the population. Since this applies even in the fastest population growth case there would be no great difference in the year 2011 between the cost per head in that case and for smaller populations.

### *iii. Sewage*

243. The relation of sewage costs to rising population seems to be very similar to that of water supply. Sewage output will increase broadly in line with water use. Although domestic sewage may be easier to handle in future because it will be more diluted, some rise in unit cost may come with the larger amounts that have to be dealt with. Rivers have a limited ability to purify themselves, and if more sewage is to be put into them it will need to be improved in quality, at additional expense, in order to prevent the rivers from deteriorating. On the other hand there may be economies of scale from larger sewage works, and in any case a very high level of purification will be required by 2011 over large areas of the country even if the population grows relatively slowly. In these areas no further improvement in quality may be required if more purified sewage is to be put into the rivers. The disposal of sludge from sewage works is already a difficult problem and if no technical solution is found its costs may grow disproportionately with the quantity of sewage and the size of the population.

### *iv. Transport*

244. Here we are concerned only with the costs of transport and not problems of amenity. We have seen no evidence that the extra claims on resources that transport would make if population grew faster would rise out of proportion, other than the need, as in other fields, for higher investment per head with a faster growing population.

245. It is generally accepted that in current conditions urban transport problems and costs rise disproportionately with town size, particularly if the town has a strongly marked centre. But a larger population does not necessitate larger towns. In any case by 2011 there could be very different patterns of transport use including restrictions on private cars. So far as inter-urban transport is concerned there is no reason to believe that costs should vary appreciably with population. Doubling the capacity of a motorway is usually cheaper, in land costs as well as construction costs, than the initial provision. Overall costs per head will depend more heavily on the distribution of the population and the form and direction of urban growth than on the number of people.

246. In these four fields, agriculture, water, sewage and transport, we find no evidence that unit costs vary sharply with increasing population. Nor, so

long as the economic system continues, is there any threat of absolute shortage or breakdown within the next 40 years. Where cost increases are to be expected due to an increase in population they are likely to be small compared with those which higher standards of living would produce, even if population did not rise. Moreover there may be areas in which costs rise less, rather than more, in proportion to population. There is no reason to alter our assumption that the rate of growth of productivity should be the same for each model.

### Implications for output and productivity

247. Table 23 sets out the implications for output of the assumptions we have made regarding labour input (paragraph 222) and productivity (paragraph 231). This table gives estimates for 2011 for each of the three population models, first as a percentage of the 1971 level and secondly as a percentage of Model I.

TABLE 23  
Factors in the growth of output, 1971 to 2011

1971	2011			2011			
	I (low)	II (medium)	III (high)	I (low)	II (medium)	III (high)	
	1971 = 100			Model I = 100			
1. Population	100	112	122	137	100	109	122
2. Labour input or total hours worked per year	100	92	97	103	100	105	113
3. Output per man hour	100	326	326	326	100	100	100
4. Total output (2 × 3)	100	300	316	336	100	105	113

Source: Population Panel.

248. In the central case the total number of man hours would not be very different from 1971, and it would be only 3% up in the high case and 8% down in the low case. Output per man-hour however, on the assumption of a 3% increase a year, would be  $3\frac{1}{4}$  times its 1971 level in each case, so that total output in 2011 would be between 3 and  $3\frac{1}{3}$  times the 1971 level. The spread in the level of output between the low and high cases is of course the same, on our assumptions, as that in the labour force, namely 13%.

249. One implication of the projections in Table 23 is that the increase in output to 2011 is largely the result of rising productivity over time and not of the growing population or labour force. To the extent that problems stem from industrial production or standards of living, the difference that a slow growing population makes as opposed to a fast growing one is relatively small. On the other hand the growth in output can provide the means, not merely of raising the material living standards of the average family, but also for tackling such major problems as poverty, deprivation and the conservation of the environment.

## **POPULATION GROWTH AND THE STANDARD OF LIVING**

250. After looking at the way in which population growth affects total output we now examine the likely effect on our standard of material welfare of different rates of population growth over the next 40 years. Calculations of this kind are of course difficult to make partly because they have to be based on highly uncertain estimates of what the future holds in store. We have tried to meet this difficulty by adopting a variety of estimates about future developments and then examining the different effects they have on our conclusions. In the end we came to the view that this country would be better off economically, to a significant if not a substantial degree, with a slower rather than a faster rate of population growth. Before carrying out the technical analysis on which this conclusion rests, let us consider how it should be interpreted.

251. Material welfare is not everything. Parents often consciously choose to make material sacrifices in order to have children. It would in no way be irrational to argue on these grounds that a reduction in the birth rate was undesirable even if it could be shown that the reduction would make living standards higher than they would otherwise be. By the year 2011 we are in any case likely to be much better off irrespective of which of the three population models proves the more realistic, and the difference in living standards due to the differences in population between the high and the low growth models is not expected to be more than some 5 to 10%.

252. That a lower rate of growth does give an advantage is, moreover, almost entirely the result of one circumstance; if we have fewer children we need to set aside fewer resources for their upbringing and education and for the provision of the additional capital equipment required when they join the labour force. In these circumstances some people might think that the economic argument for restraining our population growth is relatively unimportant. This is a matter of judgement upon which we do not seek to arbitrate. Almost everyone would agree that the effect on average living standards is one of the considerations to be taken into account.

253. We now turn to consider how to conduct our analysis. It has first to be recognised that there is no uniquely satisfactory measure of economic welfare. One may start with the total amount of goods and services produced in the relevant year but it is necessary to subtract from this the capital investment undertaken in order to support future output. In this way a figure for total current consumption is obtained but even then there are particular items whose inclusion is desirable. Education, for example, may be classed as current consumption but it is clearly in part an investment. There are items in what is termed public consumption, such as expenditure on defence and the police force, which could be called necessary costs rather than part of the standard of living.

254. Whatever one finally decides to count as consumption has then to be related to the size of the population. Taking the level of consumption per head is unsatisfactory as it takes no account of the way in which consumption requirements vary with age. A man with a wife and two children and £5,000 a year to spend would generally be regarded as better off financially than a married couple with £2,500, but it is by no means clear just how many children of a given age should be regarded in this context as equivalent to one adult.

255. Given these difficulties we thought it best not to select any single best definition of living standards but to make calculations on the basis of several different measures. Thus we have a number of assumptions about future levels of material welfare, and of course our three models of population growth. To the question posed in this chapter we therefore provide not a single answer but many. By doing this we were enabled to reach the conclusion that for a wide range of definitions and assumptions slower population growth would be likely to permit somewhat higher living standards.

### **Investment**

256. Each generation benefits from the provision made by those before it and at the same time it makes provision for those that come after. So a stock of physical equipment, including houses, schools, factories and roads, as well as an inheritance of education and skills, is passed on. If comparable levels of equipment are to be maintained an expanding population will need to devote a larger proportion of its resources to investment than a stationary one, because there will be more young people to be equipped than old people handing their equipment on.

257. For projecting investment requirements we have divided investment into two categories, first that part needed to maintain the capital stock and replace assets whose lives are coming to an end, secondly, the extension to the capital stock necessary to support the growth in population and output per head. These estimates are necessarily rather crude but we have dealt with housing and some public service investment separately. It is worth noting that extension needs per head will clearly be greater the faster the rate of growth of population. On the other hand replacement needs per head of the population or per worker will be rather less with a faster growing population. A larger proportion of the capital stock will have been recently acquired and each year a smaller proportion will be reaching the end of its life.

258. Houses are very long lasting assets provided they are properly maintained and old houses can usually be modernised. It is therefore difficult to estimate replacement needs with much confidence. We made a working assumption that houses would have to be replaced when they are about 100 years old. The annual construction rate in the first thirty years of this century was less than 120,000 dwellings but it rose to 300,000 in the next decade. We based our estimates of replacement needs in all cases on a figure of 150,000.

259. The number of additional houses needed in 2011 was estimated from projections by the Department of the Environment of the increase in the number of households during that year. Every married couple is assumed to form a separate household and projected 'household headship rates' are applied to the numbers of adults in other categories. There are substantial differences in the estimates for the three population growth models, with an estimated net increase of 169,000 households in the central case, but 108,000 on the lower growth assumption and 263,000 on the higher.<sup>1</sup> These estimates were converted

<sup>1</sup> Some allowance should also be made for an increase in the number of 'second homes' during 2011, but this is difficult to estimate and the figure seems likely to be relatively small. It is not likely to vary substantially between models.

## *The next forty years*

to values at 1971 prices on the assumption that the average new dwelling in 2011 would be comparable with one which cost £6,000 to build in 1971. This may seem a modest improvement—it compares with a 1971 average construction cost of perhaps £4,500—but a much larger proportion of households is likely to consist of only one or two persons in 2011.

260. Separate estimates were also made of investment expenditure on hospitals and public education. Assuming that expenditure on improvement and renewal of hospitals continues at about the present level, capital expenditure on hospitals is likely to represent only a very small proportion of national income; but there would still be a 30% difference in requirements between the low growth and high growth models.

261. In the case of education, investment would be more substantial, around £500m in the central case, with a spread of nearly £400m between the low growth and high growth estimated requirements. These estimates take a conservative view of likely improvements in standards but do allow for a continuing increase in the average number of years each pupil spends in school, college or university.

262. Capital expenditure on housing, hospitals and education together amounted to about £2,200m in 1971 out of total investment of about £10,000m. For 2011 the rest of investment was estimated in two parts. First, replacement requirements were estimated on the assumption that they would be a constant proportion of the stock of capital, and that the stock in turn would bear a constant relation to output. On the further assumption that these relations would be much the same as they have been recently, replacement requirements were estimated at £12,130m in the central case, £11,560m in the low growth case and £12,930m in the high growth case.

263. This procedure seems likely to over-estimate replacement requirements in the high growth case and under-estimate them in the low growth case. As discussed earlier (paragraph 257) the comparative youth of the capital stock in the high growth rate case means that a smaller proportion of it needs replacing. In order to get a maximum estimate of the effect of failure to take this into account we consider later (paragraph 266) the effect on total investment and on standard of living comparisons of assuming equal replacement needs in all models, i.e. equal to the central case estimate.

264. We assumed that the other component of investment, that needed to extend the capital stock, would be proportional to the increase in output during 2011.<sup>1</sup> It seemed reasonable to take this proportion to be the same in all models, for both output per worker and its rate of increase were assumed to be unaffected by varying population growth rates. The size of this proportion is difficult to estimate with any confidence and small differences here lead to considerable differences in the estimate of investment requirements. Stock building, as well as fixed capital extensions, is likely to vary with the increase in output and we therefore considered the two together.

<sup>1</sup> Taken as the difference between the estimates of output in 2011 as shown in Table 24 and similar estimates for 2010.

265. The basic relationship assumed was £3.9m investment extensions and stock building for each £1m increase in annual output. This is the ratio which seems to have obtained over the last decade, but we also examine the effect of ratios of 3.4:1 and 4.4:1.<sup>1</sup>

266. Table 24 sets out estimates and shows them as proportions of output or Gross Domestic Product. Total investment needs would be about 19½% of Gross Domestic Product given the central population model, 21½% in the high growth case and 18% in the low growth case. On the extreme assumption that replacement investment would be the same in all models the margins either side of the central case are reduced by ½%. Increasing the ratio of required investment extensions to increases in output, as in the previous paragraph, would of course increase the extensions requirements by an equal proportion in all models, and widen the margin of differences in total investment proportions. An increase in the ratio from 3.9 to 4.4 would widen the difference in investment between the slow growth and the fast growth case from 3.4 to 3.8%.

TABLE 24

Investment in 1971 and 2011

£ thousand million (% of GDP)

	1971	2011		
		I (Low)	II (Medium)	III (High)
<b>Investment</b>				
Housing	1.61 ( 2.9)	1.55 ( 0.9)	1.91 ( 1.1)	2.48 ( 1.3)
Hospitals	0.19 ( 0.3)	0.20 ( 0.1)	0.22 ( 0.1)	0.26 ( 0.1)
Education	0.44 ( 0.8)	0.45 ( 0.3)	0.49 ( 0.3)	0.83 ( 0.4)
<b>Other</b>				
Replacement Extensions, including stockbuilding	4.43 ( 8.0)	11.56 ( 6.9)	12.13 ( 6.9)	12.93 ( 6.9)
	3.28 ( 5.9)	16.14 ( 9.7)	19.14 ( 10.9)	23.60 ( 12.5)
<b>Total</b>	9.95 ( 17.9)	29.9 ( 17.9)	33.9 ( 19.3)	40.1 ( 21.3)
<b>GDP or Output at 1971 market prices</b>	55.52 (100 )	167.0 (100 )	175.8 (100 )	188.1 (100 )

Source: Population Panel.

**Public consumption**

267. Public consumption includes all current expenditure by central and local government on goods and services. It excludes capital expenditure and also

<sup>1</sup> Earlier in this chapter we mentioned the possibility that a faster growing population might not be prepared to forego enough consumption to finance equipment up to the standard required for 3% productivity growth. We have not considered a lower level of investment in the faster population growth case because its beneficial effect on consumption would presumably only be temporary: the effect on productivity and output would before long result in less, rather than more, resources being available for consumption each year.

## *The next forty years*

excludes transfer payments, such as social security payments and interest on the national debt, where payments are received for which there is no corresponding output. It therefore includes some things, like education and health services, which are supplied to individuals and which could be purchased by them if they were not supplied by government. It also includes other services which the community decides it needs, but which no individual wants for himself, such as the armed forces, the police, the prison service and the civil administration. There is some doubt as to whether all the services provided, either to individuals or to the community as a whole, can reasonably be regarded as contributing to the standard of living, in the sense that the more of them we have, the better off we are. Some may be of the nature of costs, and others, including perhaps education, can be regarded as investment, contributing to future production rather than to current enjoyment. We did not attempt to reach any conclusions in this field, but instead examined the effect of a number of different approaches.

268. For 2011 we made separate basic estimates of expenditure on the National Health Service and on education, and of the remainder of public consumption in 2011, on each of the population growth assumptions. We also considered possible variants from these estimates. Finally we considered the effect of including various items of public consumption, variously estimated, in the standard of living.

269. The basic projections of expenditure on the National Health Service assume no increase in expenditure per patient and that all improvements in standards are taken to arise from technical progress. But they do take into account the age structure of the population. In general apart from a short period after birth demands on the Health Services are relatively moderate in youth, but increase as old age approaches. The cost per head of the population is therefore less in the faster growth case, but the proportion of national income going to health services is rather higher.

270. The estimates of current education costs like those of investment expenditure do allow for some increase in standards, in the sense that education is expected to begin somewhat earlier on average and finish later.<sup>1</sup> On the central population assumption the proportion of national income devoted to education is below the 1971 level, at about 3½% compared with 4%. But there is a wide difference between the proportions on the low growth and high growth assumptions, these being 3·1% and 3·9% respectively.

271. The basic estimate for the remainder of public consumption assumes that expenditure per head will remain at the 1971 level. Though there is no obvious reason why we should need more police, prisons or international protection by the armed forces per head then than now, this does seem an extremely conservative estimate. It implies a fall in the proportion of national income going to these services from nearly 11% in 1971 to less than 5% in 2011, in sharp contrast with past experience. As an alternative we therefore assumed that the proportion of national income spent on these services remained constant.

---

<sup>1</sup> As an exception to the general rule (paragraph 267) we have included with the education component of public consumption government grants to universities, which are formally transfers.

272. One claim on national output not so far mentioned is exports, or rather the excess of exports over imports. This is always small in relation to total output or any of the main categories of expenditure, amounting to about £800 million in 1971, when it was much greater than in any previous year. For estimating purposes we have assumed the same surplus of exports in 2011.

273. This is an important assumption: while it is reasonable to assume that the balance in that year will still be small in current money terms we have made all our estimates at 1971 prices. If there were substantial changes in the terms of trade, defined as the quantity of imports a given volume of exports will purchase, a balance at 2011 prices would imply a large excess of exports over imports (or vice versa) at 1971 prices.

274. Some people expect that as a result of the great increase expected in world population and in the demand for food and materials, plus the limited supply of some, at least, of these, the terms of trade will move strongly against countries like Britain, which are importers of food and materials and exporters of manufactures. We would not rule out this possibility. But whether we are a country of 60 million or 75 million people, for most commodities our share of world markets will be too small in 2011 for us to affect world prices appreciably.

275. If, however, prices of food and basic materials do rise sharply relative to those of manufactures this should certainly benefit countries with such produce to export and countries with limited supplies will be better off if they can share these over a smaller population. It is quite impossible to estimate the likely difference in real national income between a smaller and a larger population in 2011 which might be due to this factor. In Appendix 3 we calculate the consequences of a very sharp increase, by a factor of 5, in the relative price of food alone for population of different sizes. In spite of these assumptions the effect is limited, mainly because no more than 5 or 6% of our total national income is spent on basic foodstuffs. Even making similar estimates for basic industrial materials it seems unlikely that the total effect would be very large. Nevertheless in a world with limited stocks of some minerals and of fertile agricultural land, and a rapidly growing population, there must be some advantage, even if it is not very great, in having more natural resources per head. This might apply particularly to countries in large customs unions which would expect to enjoy all the advantages of economy of scale in industry whatever the size of their own domestic market.

### **Some measures of welfare**

276. Subtracting the estimates of investment and public consumption from national income, and making the small allowances for excess of exports over imports mentioned above, the remainder is available for personal consumption. Table 25 sets out the main figures. It also shows a number of measures of total welfare, including personal consumption and varying proportions of public consumption, and several measures of consumers by which the total welfare can be divided to give comparable indicators of the standard of living. Separate estimates are given for each population assumption, but at this stage all the figures are based on central estimates of output and the various claims on it for

*The next forty years*

investment, etc. These estimates are extremely tentative particularly those specifying the manner in which we shall choose to spend the resources available, individually or socially. The effect of varying them is considered later.

TABLE 25

Consumption and Consumers: 1971 and 2011

	1971	2011			2011		
		I (low)	II (medium)	III (high)	I (low)	II (medium)	III (high)
		£ thousand million at 1971 prices			Model I = 100		
<b>Resources</b>							
GDP at market prices	55.5	167.0	175.8	188.1	100	105.3	112.7
Investment (including stockbuilding)	10.0	29.9	33.9	40.1	100	113.3	134.1
National Health Service*	2.2	2.5	2.6	2.8	100	104.8	112.9
Education	2.3	5.1	6.0	7.4	100	117.3	145.7
Other public consumption	6.1	6.8	7.4	8.3	100	108.8	122.5
Personal consumption	34.2	121.9	125.1	128.7	100	102.7	105.6
Personal consumption plus NHS etc.	36.3	124.4	127.7	131.5	100	102.7	105.7
Personal consumption plus NHS etc. and education	38.6	129.5	133.7	138.9	100	103.3	107.3
Personal and public consumption	44.7	136.3	141.1	147.2	100	103.6	108.0
<b>Consumers</b>							
Population (GB)	54.1	60.7	66.1	74.3	100	108.8	122.4
Adults (15 and over)	41.1	48.3	50.8	54.4	100	105.2	112.5
Equivalent adults (children = $\frac{1}{2}$ )	47.6	54.5	58.4	64.3	100	107.2	118.0
Working age population	32.4	38.1	40.6	44.2	100	106.5	115.8
Equivalent working age (children = $\frac{1}{2}$ , retired = $\frac{2}{3}$ )	44.7	51.2	55.1	61.0	100	107.7	119.2

Source: Population Panel.

\*Includes part of personal social services.

277. Though the outstanding feature of all the estimates for 2011 is the great increase on 1971, we are here interested principally in the differences between the estimates corresponding to the various population assumptions. The three columns on the right hand side of the table concentrate attention on these. In each case the estimate for the low growth assumption is taken as 100 and those for the central and high growth assumptions are shown as percentages of it.

278. In the high growth rate case total personal consumption is only 5 $\frac{1}{2}\%$  more than in the low growth case, but the inclusion with personal consumption of some or all of public consumption tends to widen this margin. Even at its maximum of 8%, however, it remains some 14% less than the 22% difference in the population in the two models. Thus total (personal and public) consumption

per head is estimated as some 12% less in the high case than in the low case.

279. This is not a fair comparison because of the different age structure of the models. To allow for these differences various estimates are made, giving less weight to children, or excluding them completely. Excluding children completely reduces the difference in the number of consumers between the models from 22% to 12½%. An intermediate estimate can be obtained by counting each child as half an adult. Similar estimates are obtained if, in addition, people above retiring age are either excluded or assumed to have needs less than those of people of working age. However, whatever the measures of consumption and of consumers are used, the standard of living appears higher on the low growth than on the high growth assumption.

280. The estimates of public consumption are consistent with a wide range of possible allocations as between different services. Moreover they take no account of any change which might be expected in the balance between the private and public sector in the provision of some services. Few people would like to see individuals and firms taking an increasing responsibility for the protection of their lives and property from criminals, though there has recently been some movement in this direction. On the other hand if with increasing affluence an increasing proportion of people purchase their own health and educational services, with fewer relying on public provision, personal consumption would increase without a corresponding increase in the standard of living. The problem is dealt with by adding to personal consumption public consumption of services of this type. If we wished to consider educational expenditure as investment and not consumption, we should need to exclude it from personal consumption. This we were unable to do.

281. We have measured welfare as average consumption in one sense or another, and we recognise that this begs some important questions. In particular we have not referred to the distribution of income or consumption and the analysis is consistent with varying distributions of income. However, the average amount available for consumption is a fair measure of potential welfare, apart from any real costs of redistribution. We see no reason to believe that these costs would differ significantly between the three cases considered.

282. Table 26 shows a selection of measures of welfare derived from combinations of the various measures of total consumption and of consumers. It shows both comparisons with 1971 and comparisons between the estimates for 2011 in the 3 different cases, with model I shown as 100. This use of indices is particularly appropriate, because absolute comparisons, for instance between the value of personal consumption per head and the value of total consumption per equivalent adult, have no significance. The precision of the numbers in the table results from the arithmetic of the models but they are only indicators of general magnitude and must not be taken as exact amounts.

283. The first measure, personal consumption per head of the population, would indicate a level of welfare 14% less with a large and growing population than with the small and relatively static population of model I. This we have already recognised to be an exaggerated estimate of the difference.

TABLE 26

Some measures of welfare in 2011

	1971	2011			2011		
		I (low)	II (medium)	III (high)	I (low)	II (medium)	III (high)
		1971 = 100				Model I = 100	
Personal consumption per head	100	318	300	274	100	94	86
Personal consumption per equivalent adult	100	311	298	278	100	96	89
Personal consumption plus public expenditure on NHS etc., per adult	100	291	284	273	100	98	94
Personal consumption plus public expenditure on NHS etc. and education, per equivalent person of working age	100	294	282	265	100	96	90
Personal and public consumption per equivalent adult	100	266	257	244	100	97	91

284. In the second measure, personal consumption per equivalent adult, children are counted as half adults and the difference in welfare between the two extreme models is reduced to 11%.

285. We might regard children as wholly the responsibility, voluntarily incurred, of adults, and divide consumption over the total number of adults only. This is done in the third measure, where we have also counted health services publicly provided as part of consumption. This greatly reduces the spread, to 6%, partly because excluding children reduces the relative difference in population, and partly because children make relatively small demands on the health services.

286. The fourth measure goes further and includes public expenditure on education as well as health on the consumption side, while giving reduced weighting to retired people as well as children in the count of consumers. This is equivalent to estimating what is left for each person of working age on the assumption that each child takes half as much as a working adult and each retired person two-thirds as much. It widens the margin between the slow and faster growth models to 10%, mainly because of the inclusion, even at only 50% weight, of children.

287. Finally, if all public consumption is included, but children are given only half weight, the margin comes out at 9%.

288. Thus we have a selection of measures, all of which show a higher level of material welfare in the case of slow population growth, with the margin varying between 6 and 14%. The latter estimate would probably be almost universally regarded as too high because it takes no account at all of differences in the proportion of children in the population, so, more realistically, the range may be expressed as between 6 and 11%.

289. This is not a very large difference, considering that almost all the measures show an increase over 1971 of more than 150% and some indicate an improvement of more than 200%. Nevertheless a variety of different measures all show some advantage for slow population growth and if this is assured it cannot be regarded as negligible. The estimates are, however, all based on a number of assumptions that could be questioned. We therefore examined the effect of making substantial changes to all the main assumptions.

### **The effect of varying the basic assumptions**

290. Table 27 shows the effect of a number of alterations in the assumptions on the percentage difference or spread between the slow growth and faster growth models, omitting the intervening arithmetic. Many of the alternative assumptions have been mentioned earlier and they are defined in the notes to the table. Some of them affect the level of welfare projected for 2011 very

**TABLE 27**

### **The effect of varied assumptions on population growth/welfare comparisons**

	Personal consumption		Personal consumption plus NHS etc. per adult	Personal consumption plus NHS per equivalent person of working age	Total consumption per adult equivalent
	per head	per adult equivalent			
Per cent difference between low and high growth models <sup>1</sup> on basic assumptions	14 <sup>1</sup>	11	6	10	9
Effect on spread of—					
Increasing productivity growth by 1%	-0.7	-0.8	-0.7	-0.3	-0.1
Reducing productivity growth by 1%	+1.2	+1.3	+1.2	+0.5	+0.2
Adjusting female activity rates <sup>2</sup>	+4.5	+4.7	+4.8	+4.4	+4.2
Increasing public consumption estimate <sup>3</sup>	+0.1	+0.1	+0.1	-0.0	—
Increasing incremental capital/output ratio by 0.5	+0.6	+0.6	+0.6	+0.5	+0.5
Reducing incremental capital/output ratio by 0.5	-0.6	-0.6	-0.6	-0.5	-0.5
Replacement investment same in all models <sup>4</sup>	-0.9	-1.0	-1.0	-0.9	-0.9
Child weighting reduced from $\frac{1}{2}$ to $\frac{1}{3}$	—	-1.3	—	-1.4	-1.4
Retired person weighting reduced from $\frac{2}{3}$ to $\frac{1}{2}$	—	—	—	+0.5	—

Source: Population Panel.

<sup>1</sup> e.g. 14% in Column 1 is the difference between 100 and 86 (see last column of first line of Table 26).

<sup>2</sup> Assuming that a larger proportion of children means a smaller proportion of women at work (see paragraph 219).

<sup>3</sup> Assuming public consumption, excluding health and education, is 11% of GDP instead of £112 per head.

<sup>4</sup> See paragraph 262.

substantially. For example a reduction of 1% in the annual productivity growth rate would reduce the estimated level of income in 2011 by about one-third, and the growth over 1971 by nearly half. But it would increase the estimated percentage margin between the low growth and faster growth cases by at most a little over 1% because some prior calls on resources will be the same per head whatever the rate of population growth. Other differences, in the estimates of investment requirements or of public consumption, have similarly small effects.

291. The estimate of the welfare margin is only affected substantially if we assume some difference in output per person of working age. This could arise from the effect of population growth on the rate of growth in productivity, but in the first part of this chapter we found no reason to believe that this was likely to be significant in one direction or another. It could also be brought about by differences in the proportion of people working. We have already examined the effect of modifying the basic assumption that the proportion of women in each age-group working in 2011 would be the same in all cases, and supposing instead that the number of non-working women per child would be the same in all cases. This change had the effect of reducing the proportion of women working in the faster growth case, and so reducing output by about 3%, and increasing the estimated output in the slow growth case by about  $1\frac{1}{2}\%$ . This effect is carried through, and frequently somewhat enhanced, because the prior changes remain the same, thus increasing the advantage of slow growth compared with faster growth by 4 to 5%.

### **Advantages of slow population growth**

292. The analysis has shown that on a wide variety of assumptions we are likely to be better off in terms of average material welfare in the year 2011 if population grows slowly than if it continues with the fertility rates of 1971, and worse off if we return to the higher fertility of a few years ago. The margin is small compared with the increase in productivity and income which it seems reasonable to expect in the next 40 years, though 5–10% of national income may not seem a small amount then, but it seems to be assured unless slower population growth means a slower rate of growth in output per worker and vice versa. We considered arguments for and against this proposition earlier in this chapter and concluded that, given the small range of variation in the rate of growth of the labour force, the net effect in either direction was likely to be very slight.

293. The advantage of slower growth, as here estimated, derives entirely from the smaller proportion of output which is required for the upbringing, education and equipment of children. There may be further savings resulting from the lower density of occupation of land, but we have not found any which seems likely to be large and can be quantified.

294. It should be noted that a small part of the advantage of slower growth is temporary. By 2011 there will already be more retired people per worker in the slow growth case and further projection into the future would result in this broadly offsetting the reduction in the number of children per worker. The advantage would not be entirely eroded, because in the faster growth case we should still have to face the capital costs of a growing population and work-

force. In the shorter term the costs of a faster growing population would have to be met before any of the additional children had begun to contribute to output. Indeed by 1986 there would already be a 6% difference in personal consumption per head between the two extreme models which would be widened to over 9% if more children also meant correspondingly fewer working women.

295. The calculations in the first part of this chapter have all been narrowly economic. No allowance has been made for the satisfaction felt by many people from bringing up their children and, in their later years, from having children and grandchildren about them. Nor has any allowance been made for any loss of amenity which may be consequent on increases in the density of population of these islands.

### THE IMPACT ON LAND

296. Since our land area is fixed and our population is increasing, many people fear that there will soon be a shortage of land in this country and that living standards will suffer for lack of space. According to some Britain is already suffering from overpopulation and any further reduction in the average amount of land per head must lead to increased pressures on land and to a decline in environmental standards.

297. Land is the source of many raw materials and foodstuffs. For these we are not confined to the land area of Britain. Imports of raw materials and foodstuffs effectively provide an increase in our land area. We have relied on such imports for the last two centuries and this reliance will continue as far ahead as we can see.

298. Land is also used for recreation. Foreign travel is a way of making more land available for this, but increased population in other countries may reduce the availability of land abroad; and if our land is kept in good condition there will always be visitors from abroad to share it.

299. The urban fabric of the country, however demands British land. About 9% of the surface area is devoted to urban purposes at the present time. A rising population and increasing standards will lead to an expansion of such areas. We consider here the increased demands for land for urban use over the next 40 years, and how far it will be possible to meet this increased demand while maintaining or increasing standards, without conflicting seriously with demands for agriculture or recreational use, or being forced to use land unsuitable for large-scale development.

300. In looking to the future something more than a simple projection of the total urban area is needed. Pressure on land varies greatly with locality. There is plenty of room for expansion in some parts of Britain, but there is serious disquiet about others such as the North West and the South East. Within regions there is considerable variation in the extent to which any particular area is under pressure. We have taken as our starting point the analyses made by an official study group, adjusted to take account of later information and our

population growth assumptions.<sup>1</sup> Projected requirements of urban land were obtained for each region based on projections of population and of urban land requirements per head. These land requirements were then compared with the supply of suitable land.

### **Land and population distribution**

301. The increase in population has not been uniform over the country. The natural increase in population is different in different areas, for example Scotland has a higher birth rate than England and Wales. The substantial net migration from Scotland, Wales and the North, however, has caused their population growth since 1900 to be slower than the average for the country as a whole. The population of the South East has grown exceptionally rapidly, its share of population increasing from 24% in 1801 to 32% in 1971.

302. These regional shifts have been accompanied by movements first from the countryside into towns and then from the centres of large towns to their outskirts. Such movements have created the conurbations and have led to declining population in many rural areas.

303. In the last 40 or 50 years, and especially since the end of the last war, government policies have been designed to counteract and control these trends. Town and country planning, green belt and other policies have been partially effective in arresting the outward sprawl from the cities and the despoliation of the countryside, and in concentrating a significant proportion of the extra population in new towns and in controlled expansions of smaller old towns. Regional policies have had less success in checking the relative decline in economic activity in the less prosperous areas of the North, Wales and Scotland and consequent net emigration from them.

304. Estimates have been made of the regional distribution of the 2011 population for our three models and these are shown in Table 28. They assume no migration into or out of the country but the regional figures allow for movement within the country, taking account of recent trends. Continued growth is expected in all regions, even in the Model I case, with faster than average growth in the East Midlands, East Anglia and the South West, but not in the South East region. The shares of the South East, West Midlands and North West regions of England, and of Wales, are reckoned to remain much the same as at present, and those of Scotland, the Northern Region and Yorkshire and Humberside will continue to decline.

### **Urban land**

305. Using these population projections it is possible to estimate urban land requirements, first by extrapolating recent trends in the acreage of urban land per head in each region to the year 2011, and then by multiplying the resulting estimates by the projected population—see Table 28.

---

<sup>1</sup> *Long-Term Population Distribution in Great Britain—A Study: Report by an Interdepartmental Study Group*. HMSO 1971.

TABLE 28

**Population and urban land needs in Great Britain, 1971 and 2011**

(The three figures quoted in each case for 2011 correspond to the three growth models described in Chapter 2)

	Population (millions)		Urban Land (thousand acres)		Urban Land—acres per thousand total regional population	
	1971	2011 <sup>1</sup> (estimated)	1971	2011 <sup>2</sup> (estimated requirements)	1971	2011 <sup>3</sup>
<b>England</b>						
Northern	3.31	3.45 3.76 4.23	350	465 505 565	106	134
Yorkshire and Humberside	4.82	5.20 5.66 6.36	420	545 595 670	87	105
North West	6.75	7.44 8.10 9.11	515	735 800 900	76	99
East Midlands	3.40	4.24 4.62 5.20	350	495 540 610	103	117
West Midlands	5.13	5.75 6.26 7.04	435	540 590 660	85	94
East Anglia	1.68	2.20 2.40 2.70	220	275 300 335	130	125
South East	17.29	19.21 20.90 23.52	1,245	1,400 1,525 1,715	72	73
South West	3.80	4.54 4.94 5.55	480	585 635 715	126	129
Wales	2.73	3.00 3.26 3.67	345	465 510 575	126	156
Scotland	5.24	5.68 6.18 6.95	570	790 860 965	109	139
Great Britain	54.14	60.71 66.07 74.33	4,930	6,315 6,870 7,720	91	104

Source: Population Panel.

<sup>1</sup> Total population; the small difference between the official regional estimates of the Home population and the Total population has been allocated to regions pro rata.

<sup>2</sup> Regional estimates for 2011 assume that the distribution between regions is the same as in an official projection to an earlier date.

<sup>3</sup> Based on a projection of trends in urban densities, 1950-70.

Figures may not add exactly to totals, due to rounding.

306. Our knowledge of trends in urban land densities is not firmly based: there are at present no regular statistics of land use in this country. The Department of the Environment's work had to be based on an academic study of the extent of urban development in 1950.<sup>1</sup> These national figures were allocated between the regions and the estimates were carried forward to 1971. In the absence of more reliable statistics we believe that the estimates, although not precise, do reflect the present position and recent trends adequately for our purpose.

307. The urban area considered here includes not only land within towns and cities used for houses, factories, shops and offices, transport and other services and urban recreation, but also some land in the countryside used for such purposes, for example, villages, isolated dwellings, roads and railways. The projections are therefore of an area that is wider in scope than the customary meaning of urban areas.

308. The general trend has been towards a higher urban acreage per thousand population, the national average growing from 59 in 1900 to 91 in 1971. The projection in Table 28 assumes that this trend will continue, though less strongly, to reach a national average of 104 in 2011. We may expect urban areas to be less densely populated on average in the future; there will be more urban land per thousand population.

309. This is also likely to be true for almost all regions. For some regions in which the urban areas include a number of old industrial cities there will be considerable increases in urban acreage per head. This reflects both the development of new urban areas with open space as well as houses, schools, shops and factories, and the redevelopment of the old areas, all at more spacious modern standards. In other regions there may be only a limited increase or even a reduction, either because the acreage per head is already high, as in the South West and East Anglia<sup>2</sup>, or because there is considerable pressure on the available land, as in the South East.

310. In assuming that the average density of population in urban areas will decline we are not of course denying the possibility that certain limited areas, such as lightly populated outer suburbs, will see an increase in their density. Nor are we denying that the density of population both over the whole country and individually in each region, will increase. The point is simply that in the urban areas, in which nearly everyone lives, space standards will improve. On the basis of these trends, together with the population estimates, Table 28 gives estimates of the urban acreage of each region in 1971 and 2011.

311. A particular feature of this projection is the extent to which the increase in the urban land required depends upon the growth of population. It is based on two factors, urban acreage per head and population. The urban acreage per head is projected to increase by 14% over the 40 year period, roughly equal to the increase in population projected in Model I, but less than half the

<sup>1</sup> R. H. Best and J. T. Coppock *The Changing Use of Land in Great Britain*. Faber, 1962.

<sup>2</sup> Urban acreage per head declines slightly in East Anglia, partly because more houses will be built in existing towns of low density.

TABLE 29

**The Urban Land Balance in Great Britain, 1971 and 2011**

(The three figures quoted in each case for 2011 correspond to the three growth models described in chapter 2).

	Total area <sup>1</sup> (million acres)	Unsuitable for development <sup>2</sup>	% of total area <sup>1</sup>			
			1971	2011	1971	2011
<b>England</b>						
Northern	4.8	69.7	7.3	9.7 10.6 11.8	23.0	20.6 19.8 18.5
Yorkshire and Humberside	3.5	42.4	12.0	15.5 17.0 19.1	45.7	42.1 40.7 38.5
North West	2.0	47.0	26.1	37.2 40.5 45.6	26.9	15.7 12.5 7.4
East Midlands	3.0	13.3	11.6	16.5 17.9 20.3	75.0	70.2 68.7 66.4
West Midlands	3.2	40.3	13.5	16.8 18.3 20.5	46.2	42.9 41.4 39.2
East Anglia	3.1	27.3	7.1	8.9 9.7 10.8	65.6	63.9 63.1 61.9
South East	6.8	40.3	18.4	20.7 22.5 25.3	41.3	39.0 37.2 34.4
South West	5.8	51.9	8.2	10.0 10.9 12.2	39.9	38.1 37.3 35.9
Wales	5.1	50.6	6.7	9.1 9.9 11.2	42.7	40.3 39.4 38.2
Scotland	16.7	71.7	3.4	4.7 5.2 5.8	24.9	23.6 23.1 22.5
Great Britain	54.0	53.0	9.1	11.7 12.7 14.3	37.9	35.4 34.3 32.7

*Source:* Population Panel.

<sup>1</sup> For Scotland, relates to mainland only and excludes inland water. Thus the percentages of the 'Total Area' of Scotland and of Great Britain are somewhat inflated.

<sup>2</sup> Relates to major restraints only, as at 1966-69. See text (paragraph 313).

<sup>3</sup> Not necessarily available for development. These figures include high quality agricultural land. See text (paragraph 313).

Figures may not add exactly to totals, due to rounding.

population increase projected in Model III. Population increase plays a considerable part in the increased demands for land for urban use in sharp contrast with the situation described in the first part of this chapter, where the increase in output expected may be well over 10 times the increase in population.

### **The availability of land**

312. The estimates of urban land area need to be seen against the available supply of land for urban development. Table 29 compares the amount of urban land in each region in 1971 and 2011 with the area of land still undeveloped, after allowing for that which is unsuitable for large-scale development.

313. Land considered inappropriate for development includes areas such as national parks, green belts, and areas of outstanding natural beauty where development is for the most part restricted for planning reasons. In addition it includes as not suitable for development all land over 800 feet (600 feet in Scotland). It does not include steep land or land liable to flooding, or other local restraints on development, nor does it include high quality agricultural land. It follows that by no means the whole of the remaining balance would in practice be available for development.

314. It is nevertheless clear that for the country as a whole, and on our basic assumptions, there is no danger of an overall shortage of land for urban development by 2011 or for some time thereafter. Not only is there sufficient space for all the urban fabric but there will still be considerable areas of land available for further development if necessary. The proportion of the total area of Great Britain devoted to urban uses would increase from its present level of 9% to between 11% and 14% by 2011.

315. Looking at the regions individually it is in the North West that the situation looks the most difficult. There, on the high growth assumption, nearly half the total area would be urbanised by 2011, and very little of the rest would be available for development. In this region there may be policy changes invalidating our assumptions; or they may prove false for other reasons. Either urban densities will need to be higher than we assumed, or protected amenity areas will need to be developed, or emigration will be greater and the population smaller than we assumed. The same situation would arrive, though less acutely and a little later, if the population grew according to Model II. These problems are major considerations in the work now in progress on a strategic plan for the North West.

316. Elsewhere the study shows that on reasonable assumptions there is no absolute shortage of land for urban development in prospect during the next 40 years, even in the South East. In each region there is room to improve housing standards, to give people larger gardens, and to build factories, public buildings and roads to meet the demands of any likely population expansion up to the year 2011. This would be possible without any infringement of green belts or national parks or similar protected areas.

317. The picture that emerges is in sharp contrast to the prevailing view of land scarcity. We agree that pressure on the land in general will increase and that there will be particular difficulties in the North West region. But we do not see urban land problems during the next 40 years as primarily due to increases in the national population. Difficulties arise mainly from changes in the distribution of population brought about by migration, and are only to a small extent due to the growth of population.

318. Land shortages and problems of land allocation are local and arise largely from migration to certain favoured locations, often the large conurbations and the country round them. Simultaneously measures are taken to limit urban and suburban sprawl and protect tracts of countryside within easy reach of these population centres.

319. The problems are therefore political, social and administrative. On the other hand a faster rate of growth of population may exacerbate matters merely by increasing the already complex problem of organisation, and a slower rate of growth of population would somewhat ease the difficulty of coping with land use problems.

320. There is insufficient detailed and up-to-date knowledge of internal migration. Information about migration was first collected in the 1961 census. In the 1966 sample census and the 1971 census the questions were repeated and extended, although the results of the 1971 census will not be available for another year or so.

321. What is lacking is analysis of this data together with other information which will show the quantitative relations between migration flows, the population structure and the economic and social circumstances of the areas out of which and into which people move. This would enable forecasts of migration to be improved and indicate ways in which trends can be altered where they seem to be leading to an unsatisfactory situation.

322. Even with the 1971 census results detailed information will only cover a period of 10 years. For policy purposes research results based on information over a longer time span is needed. In addition there is a clear administrative need for more accurate statistics of recent changes in migrant flows. For these reasons we believe that there should be a mid-decade census of population in 1976 with migration questions comparable with those asked in 1971. No other source seems likely to yield comprehensive information about migration and the circumstances of migrants.

### **Agricultural land**

323. The expansion of urban areas will be largely at the expense of agricultural land, sometimes of the highest quality. The average losses to be expected on the basis of three population models are 35,000, 48,000 or 70,000 acres a year. This loss has to be viewed against the total agricultural acreage of the United Kingdom, which is some 30 million acres excluding rough grazing. Evidence from the Ministry of Agriculture, Fisheries and Food indicates that

## *The next forty years*

increased agricultural productivity should more than compensate for urban expansion at the projected rates, (see also Edwards and Wibberley).<sup>1</sup>

### **The countryside as an amenity**

324. The definition which we use for land unsuitable for urban development assumes large areas free from development. Green belts, national parks and areas of outstanding natural beauty are all classed in the official study as being unsuitable for development. Nevertheless it may be argued that this merely preserves the existing situation and that this is itself unsatisfactory. Increasing population will demand increased recreational use of the countryside, which is simultaneously being compressed into a decreasing space as urban land demands increase. Moreover it is claimed that the condition of the countryside is already deteriorating rapidly.

325. It is certainly the case that large numbers of town-dwellers use the countryside regularly as a means of enjoyment.<sup>2</sup> The numbers doing so have increased and will increase with rising affluence, particularly with the spread of car-ownership, and with increasing leisure, as well as with the growth of population. Even if the population were to remain constant pressure on the countryside would still increase rapidly in the next few decades.

326. Most people, however, do not use the country as a means of finding solitude and do not therefore require the use of large empty areas of land. Consequently much can be done to maintain and improve the present availability of the countryside for recreation, even in the face of a rapidly rising demand, without really serious competition with agriculture for land. This could be done by devoting more resources to organise a relatively small part of the total countryside for leisure, by creating country and coastal parks, picnic areas, networks of paths and the development of the National Parks towards something like their original promise. The recreational demands on the countryside, at least as to the quantity of land required, might then be accommodated without serious difficulty for the next 40 years, in spite of any likely rise in population. The cost of the provision, however, may well increase disproportionately as more is required.

327. There are however some intractable problems. The more favoured places of resort or recreation can come under tremendous pressure from the numbers visiting them, so that there is not only loss of pleasure through crowding but their amenities are threatened by physical destruction.<sup>3</sup> Increasing population can only add to the damage to such places, or to the need for restriction of access.

328. The recreational use of the countryside, though it demands the exclusive use of only small areas of land, requires a background of pleasing landscape, which is for the most part agricultural. Will increasing population contribute

<sup>1</sup> A. M. Edwards and G. P. Wibberley 1971. *An Agricultural Land Budget for Britain 1965–2000*.

<sup>2</sup> See J. A. Patmore, *Land and Leisure*, 1970; North West Sports Council, *Leisure in the North West*, 1972.

<sup>3</sup> *The Biotic Effects of Public Pressures on the Environment*, Monks Wood Symposium, NERC, 1967.

to what is felt to be a deterioration of this landscape? Certainly the erosion of the countryside by reservoirs, roads and buildings would be greater with a population growing according to Model III than with a stationary population; though any likely population growth may prove to be a less important factor than the expected growth in affluence.

329. A good deal of concern at present is caused by the recent developments in arable farming which are destroying many of the familiar hedgerows and trees in parts of England. This is a change which is certainly impoverishing our natural history. The visual aesthetics are not so clear; it is possible that the new appearance of the landscape will soon seem as pleasant to many people as did the open fields and commons of an earlier time, before they in their turn were destroyed by hedgerows and trees. Population growth can hardly be charged with responsibility for technological change in agriculture.

330. It is wrong to talk of a general land problem. The problem is what will happen in particular areas. There are problems of severe pressure on land now in desirable city locations, residential areas or favoured beauty spots, and these problems will continue if not increase in the future. Population growth plays a relatively minor part in creating these local pressures. Increasing affluence and internal migration are the major factors involved. A slower rate of population growth will enable the problems of organisation to be resolved more easily, though it must not of itself be regarded as likely to solve the problems.

## **SOME SOCIAL IMPLICATIONS OF POPULATION GROWTH**

331. We now consider various ways in which people interact both in a direct sense and less directly through environmental changes. Such interactions may be influenced by the density of the population, and there has been considerable concern that increasing population and population density may lead to a considerable increase in the problems arising from such interactions.

### **Towns and cities**

332. Towns and cities exist because there are economic and social advantages in considerable numbers of people living closely together. Firms in many industries find it advantageous to work close to their suppliers, their customers or even their competitors. Many public services work more efficiently with large numbers. Large urban areas provide a wide range of facilities and opportunities for their populations, and some minority cultural and social tastes can only be catered for economically in high density areas. On the other hand expanding cities may of their own momentum pass the point at which the disadvantages of size exceed the advantages, but it is very difficult to define this point.

333. Some features of living in towns, such as increasing traffic congestion, are only in part due to population pressure. Over the last six years population in this country has increased by less than 3% but the number of cars by over 30%. Restrictions on private cars will need to be imposed in the future regardless of the growth of population. Nonetheless the problems of planning successfully could be lessened if there was a slowing down in the growth of the population to be accommodated.

### Noise

334. Noise, particularly from road and air traffic, is felt to be a serious and growing nuisance. It is not, however, mainly a population problem. Rising standards of living have contributed much more than rising population to the increase in noise levels. Moreover we need not simply endure it. In many of its aspects the nuisance can be effectively dealt with, though of course at some cost. By imposing standards of quietness on vehicles and aircraft their noise can be reduced, but nevertheless as their numbers increase, the cost of control is likely to increase disproportionately. To some extent, therefore, a larger population will tend to produce a noisier environment, or to require a higher cost per head in control measures.

### Pollution

335. The pollution of land, water and air in Britain creates problems which have been widely discussed and are currently under close study by the Royal Commission on Environmental Pollution. Pollution is largely of our own making; the contribution of the rest of the world is not yet serious though it could eventually become so. It is due to a history of technical change in industry and agriculture, which failed to give due weight to environmental consequences; to growing affluence, which has increased the amount of material per head discarded into our limited environment; and to the growing number of people, especially as they are concentrated in certain areas. In the absence of anti-pollution action a growing population would make things worse.

336. Pollution in its grosser forms, apart from noise, is not getting worse in Britain, rather the contrary. Anti-pollution action of various kinds has been taken for some time and there will clearly be more in the future. Control is already technically feasible in the great majority of instances, though of course at a cost. A larger population poses a greater pollution threat than a smaller one, but it also provides greater total resources to meet the cost of controls. The realistic question, then, is not whether a larger population means worse pollution, or more money spent in preventing it, but whether it means a greater cost per head in controlling it.

337. Because of environmental limits the cost of maintaining a tolerable state may well in some instances increase disproportionately as the quantity of pollution increases. Rivers, for instance, have only a limited ability to deal with organic waste. If the quantity of wastes discharged into them increase, more expensive methods of purification will be required to maintain a given quality of river water. At a given level of affluence a larger population would therefore have to spend more per head than a smaller one, and this may be true of a number of anti-pollution measures.

338. In terms of our different population models it can hardly be supposed that the difference in cost per head between the fastest and the slowest growth rate of population will be other than small. A considerably greater contribution to the threat of pollution and to the costs per head of preventing it will be made by the rising standard of living.

## **Overcrowding and malnutrition**

339. It is sometimes argued that there is a correlation between increasing population, overcrowding and malnutrition. Superficial observation appears to show that large families are more commonly found in overcrowded conditions with undernourished children, and it is commonly believed that it is the large families that lead to increasing population. But overcrowding and malnutrition is not a long-term population problem in contemporary circumstances, it is a problem for social policy.

## **Epidemic disease**

340. There is no evidence that the spread of epidemic disease in Britain is more likely as a consequence of greater density of population. Although the population has increased over the last 50 years, in general the health of the population has improved significantly. The control of food-borne and water-borne diseases depends essentially on the efficiency of the public services, not population density. The spread of droplet-borne epidemic diseases depends particularly on the way in which people live; a closely integrated village-type community, rural or urban, is more likely to be conducive to the spread of disease than communities living in relative isolation in tower blocks or in suburban sprawl.

341. It is true, of course, that serious breakdowns in world epidemic control administration (whether caused by population pressure or not) would increase the effort and resources, and possibly the constraints on freedom to travel, required to prevent their spread into this country. We should not plan on the assumption that the public health services would prove inadequate.

## **Stress**

342. On the basis of observations and experiments on animals it is sometimes asserted that crowding of human populations may lead to stresses that impair the health and happiness of individuals and the social behaviour within communities.

343. The evidence from research on animals may be summarised as follows. The social organisation found amongst the species of mammals is diverse yet it commonly seems to include mechanisms of social interaction that regulate population density. If the population becomes unusually dense, mortality or emigration may increase before there is serious exhaustion of food or other resources. An increase in conflict between members of the population often seems to be an important factor in this, though it is difficult to determine the actual cause of the deaths that occur. These are usually put down to a somewhat ill-defined condition of 'stress', involving adrenal disorders.

344. Crowding may also reduce fertility, sometimes severely and persistently, in various little-understood ways, most of them presumed to be related to the increased conflict and general excess of social interaction. It seems clear that

this complex of social mechanisms is an important element in the regulation of animal numbers. In a few species the regulation is far from smooth, and consequently populations fluctuate widely, dramatic upswings being followed by catastrophic falls.

345. It has been argued that if the density of human populations were sufficiently raised, responses analogous to those found amongst animals would appear, even though resources were abundant and infectious diseases controlled. It is suggested that social disruption, accompanied by stress diseases, raised mortality or lowered fertility, would be produced by excessive social interaction in the human mammal as in other mammals. The argument by analogy, is, however, in this case not a strong one. Man is a most unusual mammal precisely in his social organisation, and in this field evidence from animals can do no more than suggest what might be looked for in human populations.

346. There is very little evidence to suggest that living at a high density has the same effects on man that have been found in other mammals. Men have lived in conditions of intense local crowding at least since the first cities were founded. High mortality, and at least some kinds of stress, have certainly been apparent in these conditions; but it has rarely been possible to disentangle the effects of such common accompaniments of crowding as poverty, malnutrition and defective hygiene from the direct psychological effects of crowding.

347. In any case the evidence must be set against the levels of overcrowding, or population density, to be expected in Britain during the next three or four decades. Urban densities have been declining steadily during this century and we expect this to continue in the future. Future population growth will not counterbalance this trend: arguing from animal evidence to British conditions indicates a lowering of stress conditions. Overall densities in all regions are indeed likely to increase but the levels to be expected during the next 40 years seem hardly likely to raise social interactions to levels at which the effects found in animal populations could occur.

### **Social malaise**

348. We have looked therefore for less extreme manifestations of social malaise that might be correlated with increasing population. It has been suggested that signs are indeed detectable, particularly in deteriorating mental health and in various supposed indices of social disintegration. But here again the evidence is inconclusive. It is not merely that the trends cannot be clearly ascribed to increasing population, but often that the trends cannot even be shown to exist.

349. Thus, in the field of mental health there is no evidence that psychiatric disorder is on the increase. There is increased use of psychiatric services, but this is probably a reflection of the effectiveness and public acceptability of the treatment offered. Local authorities are spending more money on the care of the mentally handicapped; but this seems due not to increased need but to the move towards more community care and less long-term confinement in mental hospitals. The reported attempted suicide rate in the United Kingdom has

risen, as in a number of other developed countries, although the suicide rate itself has dropped. The reasons for this are, however, complex and certainly include the removal of the stigma, both legal and moral, associated with a suicide attempt. There is no evidence for any association between this index and population pressure.

350. Some psychiatrists have suggested that a satisfactory standard of mental health requires the availability of solitude, a recreational need that modern pressures make increasingly important and rising population increasingly difficult to satisfy. But no evidence seems to be available that shows that the need is widespread. Only a small minority of the population seeks or has ever sought recreational solitude. This minority is not necessarily unimportant, however, and it may grow with changing tastes.

351. Various other indices of supposed social disintegration such as the incidence of alcoholism and drug taking, promiscuity rates or crime, are sometimes laid at the door of population increase. What the evidence seems to support is a relationship between the breakdown of former family patterns or social attitudes and some of the socio-pathological manifestations. It seems unreasonable to force the evidence to support a relationship between increases in population and increased social disintegration. There must be a large measure of subjective judgement in the response to these questions.

### **Rules, regulations and administration**

352. It has been argued that as population grows and population density increases the problems of administering society will become more difficult to solve, and that a larger population will need to be more closely regulated. This will lead to an erosion of individual freedom.

353. This is a field in which very little work has been done. On the one hand the forms of democratic government evolved in Western Europe and America during a period of very rapid growth of population. On the other hand, as population grows in a finite habitat and people live more closely together, the actions of any one individual are bound to affect an ever larger number of his fellow citizens. It could be argued that in these circumstances individual action needs to be even more closely regulated, in order to avoid offence or disturbance to one's neighbours. Thus, controls over land use and physical planning have become necessary as population has grown, urban congestion has led to restrictions on traffic, and other regulations and restrictions on the individual have been introduced.

354. Here again there is some difficulty in disentangling the effects of population growth from those caused by the growing complexity of modern life, the greater interactions involved in present society, and the rise in the standard of living. Traffic congestion is a case in point, where living standards have been a much more important causal factor than population growth.

355. We do not think that the rates of population growth that this country is likely to experience during the next 40 years or so are likely to lead to a

### *The next forty years*

significant erosion of individual freedom. But if a population double or treble the present size were to be accommodated in the United Kingdom, it is not unlikely that its members would have to put up with greater restrictions on movement and freedom of action than is the case today.

356. A larger population also makes for greater difficulty in participation in government. In this connection we note that a Royal Commission was appointed in 1969—the Commission on the Constitution. Its terms of reference are set out in Appendix 4.

357. Given the increasing complexity of the administrative services needed for a larger population, and the need for efficient allocation of resources, the problem of combining good administration with democratic participation is likely to be more difficult with a larger than with a smaller population. Here again, however, the differences between our three models are likely to be only marginal, and we do not think that the growth rates of population we envisage in the immediate future are likely to have much effect.

## CHAPTER 4

### BRITAIN IN THE NEXT CENTURY

		<i>Paragraph</i>	<i>Page</i>
To the middle of the next century .. . . . .	359	95	
The implications of population growth .. . . . .	363	96	
i. Economic factors .. . . . .	364	96	
ii. Land use .. . . . .	365	96	
iii. Social interactions .. . . . .	368	97	
iv. Genetic effects .. . . . .	370	97	
Summary .. . . . .	374	98	



## CHAPTER 4

### BRITAIN IN THE NEXT CENTURY

358. In considering the significance of population growth for Britain we have so far restricted ourselves to the next 40 years. We now look further ahead to see what the next century may have in store.

#### To the middle of the next century

359. This involves a much greater degree of speculation than looking over the next 40 years. Our models are constructed in a mechanical way and are therefore the logical product of given assumptions. They show what would happen if today's population were to evolve steadily along the assumed paths. Population does not in practice develop in this manner, fertility in particular fluctuates considerably in the short run and is far from stable over long periods. The assumption that mortality will decline steadily, though at a diminishing rate, may prove unfounded. It is possible that within a span of 80 years medical science may achieve a breakthrough in the diseases of late middle age resulting in a sharp reduction in mortality of these age groups. Thus our models may in fact underestimate population by a small amount.

360. Table 30 sets out our three models carried forward to the middle of the next century.

**TABLE 30**  
**British population to 2051**

	1971	2011	2051	Change in 2051	
	Millions			Millions	%
	Model I (low)	54.1	60.7	63.6	+0.0
Model II (medium)	54.1	66.1	81.9	+0.4	0.5
Model III (high)	54.1	74.3	116.5	+1.3	1.2

*Source:* Office of Population Censuses and Surveys.

By 2051 the Model I population is still growing very slightly, but to all intents and purposes a stationary population may be said to have been achieved much earlier, say by 2030. After that time, growth is so small as to be insignificant.

361. On the other hand Models II and III will be reaping the full consequences of their built-in growth rates, the effect of the assumption that fertility remains significantly above replacement level. Their populations will still be increasing, and although the percentage rates of growth will remain relatively stable the absolute size of their population will be large, 82 million and 116 million respectively. Moreover the absolute increase at 0.4 and 1.3 million a year will be substantial and growing.

## *Britain in the next century*

362. The main differences between the models in terms of age structure can be seen from Table 31. The faster-growing population has a higher proportion of children and a smaller proportion of elderly people than is the case with the slower-growing model. But taking the proportion of the young and the old together there is little difference between the models; the overall dependency ratio is similar.

TABLE 31  
Age structure in 2051

Age	Model			%
	I (low)	II (medium)	III (high)	
0-14	20	23	27	
15-59/64*	61	61	60	
Over 60/65*	19	16	13	
	100	100	100	

Source: Office of Population Censuses and Surveys

\*15-59      } Women      15-64      } Men  
60 and over      }      65 and over      }

## The implications of population growth

363. Much of our earlier analysis can be extended to the middle of the next century without difficulty. For example calculations can be made showing the amount of land taken up by urban developments, varying from  $12\frac{1}{2}\%$  to over 20% of the total land area. But mechanical exercises of this type become considerably less useful the further ahead we speculate. Technological innovations become increasingly important, the composition of output would undoubtedly be very different from that of today, and the whole life-style of the population is likely to change considerably. Comparison of the possessions and life-style of the average householder of 1890 and 1970 makes this point clear.

### *i. Economic factors*

364. In the middle of the next century the general economic implications of continued population growth would still apply. The population with the faster rate of growth would have a slightly lower standard of living and for many purposes the effects of increased output would totally outweigh the effects of population increase. It is not possible to say any more than this and it would be foolish to attempt any detailed prognostication.

### *ii. Land use*

365. It is clear that both for Model II and particularly Model III, the pressure on land in 2051 would already have become very considerable. Moreover the absolute increment of the population would be of the order of

$\frac{1}{2}$  to  $1\frac{1}{2}$  million a year. The new demands for land in any year would be large and they would also be accelerating.

366. These demands would largely take the form of an increase in the urban area, unless urban densities were to increase to levels substantially beyond those envisaged today. The removal of land into urban use, at an accelerating rate, would begin to make appreciable inroads into the supply of agricultural land. Even if technological change allowed, for a time, the production of sufficient food, the availability of the countryside for recreation would be seriously reduced.

367. Although we cannot predict the extent to which standards of living might change between 2011 and 2051 it is clear that the leisure pursuits of the much larger populations could also make heavy demands on land. It is possible that new, less land-intensive, leisure pursuits might emerge, or that access to the countryside would be made more difficult because of restrictions on private transport. Even so the combination of increased population and reduced non-urban land area would create further pressures on the land.

### *iii. Social interactions*

368. The possibilities of technological change over a period of 80 years make it difficult to predict either the extent or the nature of such problems as noise, pollution, urban congestion, mental health, stress or social malaise. Some problems could be solved, others may have arisen of which we know nothing as yet. On the other hand the nature of the problems would be both quantitatively and qualitatively different if Britain had a population of 65 million, as opposed to 115 million.

369. Certainly a large and rapidly expanding population would entail a very complex organisational system to cope with all its demands. Providing for the population increase alone would mean difficult problems in the acquisition of land and the construction of the necessary buildings. It would seem that a Model III population in the middle of the century would necessitate a considerably more regulated society than at present.

### *iv. Genetic effects*

370. It is only on a time scale that extends over a number of generations that it becomes relevant to think about genetic effects. The genetic composition of the population is likely to be altered by any changes in its growth rate. For instance, some individuals who bear damaging genes, producing disabilities of various kinds, may tend to have relatively small families. If the growth rate of a population were to slacken and large families to become less common, the relative contribution of the bearers of damaging genes to posterity would very slowly increase. Diminishing the incidence of childlessness by medical means could have a similar effect. But there may well be genes that we would regard as desirable that also tend to be associated with small families. Their frequency too would very slowly increase if the relative number of large families decreased.

371. We lack sufficient knowledge to make any useful prediction as to the nature of the genetic changes which would occur as a result of different patterns of family sizes. We can be fairly confident, however, that with the rather small differences in growth rate we are considering, genetic changes would be slight within a time-span of several generations. We need to know much more about human population genetics to monitor possible trends, but no genetic problems generated by changing growth rates are likely to require urgent action.

372. Since the inheritance of IQ has been much discussed it requires more extended comment. IQ is rather strongly inherited, in the sense that probably over half the IQ variation of the population is accounted for by genetic variation. It was found some years ago that children with higher IQ tended to come from smaller families, which seemed to imply that the genes concerned with high IQ were being reproduced less than those concerned with low IQ, pointing to a decline in the average IQ of the British population. The picture given by this study was acknowledged to be incomplete in that, since it was based on investigation of the children, a failure to reproduce at all by any segment of the population was neglected; and it subsequently became clear that a substantial proportion of people with low IQ never had children.

. 373. An American investigation,<sup>1</sup> in which the IQ of parents was known and was compared with the number of their children, showed a complex relationship from which it could be deduced that the average IQ of the American population would very slowly rise, if as a whole it continued to behave like the sample examined. No significant change in the average IQ of British children has in fact been detected, over a period which is admittedly rather short, and on the whole it seems likely that the rate of reproduction at different IQ levels is approximately in balance. But it may not remain so, and the balance may indeed be somewhat precarious. For instance, were there to be a widespread attempt to limit reproduction in order to stabilise or reduce the population, those who were moved to take part might not represent a random sample of IQs. Since IQ, for all its limitations, is a well-standardised measure of important abilities, it would be valuable to monitor its relation to family size in the British population.

### **Summary**

374. In summary our earlier analysis indicates that up to the year 2011 there are certain disadvantages to be associated with a faster, as opposed to a slower, rate of growth of population. Our review in this chapter shows that on the basis of our present knowledge and criteria these disadvantages will increase considerably if population is allowed to continue to increase at either the Model II or Model III rates of growth until 2051. If we continue the mechanical extrapolation of our population models still further ahead we rapidly reach situations where the size of the population would be excessive by every standard. At some point population growth must slow down and stop and the consequences of this must be faced.

---

<sup>1</sup> See L. L. Cavalli-Sforza and W. F. Bodmer, *The Genetics of Human Populations*. W. H. Freeman and Co. San Francisco 1971.

375. Given the time that any measures to affect population growth might take to act, and the in-built momentum due to the age structure of the population, any slowing down of population growth would have to start some 60 years in advance of the time of reaching a stationary population.



## CHAPTER 5

### POPULATION AND POLICY

	<i>Paragraph</i>	<i>Page</i>
<b>A Population Policy</b> .. . . . .	376	103
An optimum population .. . . . .	381	104
An attitude to population .. . . . .	386	105
Implications for future Government policy .. . . . .	392	106
<b>Extension of Family Planning Services</b>		
Unplanned pregnancies .. . . . .	396	107
The possibility of family size control .. . . . .	399	108
i. Methods of contraception .. . . . .	401	108
ii. Attitudes to family planning .. . . . .	407	109
iii. Knowledge about contraceptive techniques .. . . . .	410	110
iv. Advisory services .. . . . .	411	110
v. Financial arrangements .. . . . .	415	111
The effect of extending family planning services		
i. Fertility .. . . . .	417	112
ii. Health .. . . . .	420	113
iii. Social disadvantage .. . . . .	424	114
iv. The moral issue .. . . . .	426	114
v. Venereal disease .. . . . .	433	116
vi. Education .. . . . .	435	117
Sterilisation .. . . . .	436	117
Abortion .. . . . .	441	118
Cost of developing family planning services .. . . . .	445	119
Family planning as an adjunct of population policy	448	120
<b>Other Possible Elements in a Population Policy</b>		
Informing the public .. . . . .	449	120
Persuasion by the Government .. . . . .	452	121
Social and fiscal policies .. . . . .	453	122
Other measures .. . . . .	456	122
Wider implications .. . . . .	458	122



## CHAPTER 5

### POPULATION AND POLICY

#### A POPULATION POLICY

376. Against the background of continuing population growth, both in Britain and in the world as a whole, there has been a growing body of public opinion in this country which argues that for economic, social and environmental reasons, Governments can no longer regard population questions as outside their concern, and that the Government should adopt a 'population policy'.

377. Policies towards health and welfare, social security, family allowances, housing, education and the distribution of tax burdens as between families of different size may all affect, directly or indirectly, people's decisions about the number of children they wish to have. But so far no British Government has framed its fiscal or social policies with the object of influencing the size or rate of growth of population. The total size of the population, unlike its distribution, has been regarded as something outside the responsibility or concern of Governments in the formulation of policy.

378. A Government which adopts a policy towards population will need—

- (a) to formulate a general attitude on the size and rate of increase of the country's population, based on the best assessment of the size and rate of increase, and their implications, and on judgements about whether these are satisfactory or unacceptable;
- (b) in the light of this assessment, to decide what policy action it can or should take to influence the size or rate of growth of population, taking account, as far as possible, of their wider implications, and recognising that it may when appropriate regard population considerations as one of the factors determining its attitude to social and fiscal policy generally.

379. Any policies designed to influence directly the number of children people have would involve some extension of the role of the State as so far conceived in this country, and attempts to control the size of families or to put pressure on individual couples to limit their families would raise very deep questions of individual freedom and the privacy of the family, with profound moral and religious implications. Any approach to population questions must recognise the importance of these issues.

380. Whether the population is too large or too small, or whether it is growing too fast or too slowly, are not questions which can be discussed in the abstract, but must be related to the present situation and the way it is likely to develop. The position as we see it is as follows—

- (a) on present projections of natural increase, the population will almost certainly rise from 54 million in 1971 to around 64 million in the course of the first decade of the next century;
- (b) if that rate of increase were to continue, total population could rise to over 80 million by around the middle of the next century;

## *Population and policy*

- (c) even if fertility were to fall within the next decade to a level consistent with no more than replacement, the present age structure is such that population would continue in the long term to increase significantly for something like sixty years;
- (d) even if average family size were to fall rapidly to 1.6 children per family, Britain's population at the end of the century would be not much lower than it is now; and would still amount to about 40 million by the middle of the next century; the social consequences of the resulting profound changes in age-structure caused by this fall would almost certainly be serious.

### **An optimum population**

381. It is impossible to relate these prospects to the idea of an 'optimum population'. The concept of 'optimum' population was originally conceived in economic terms: i.e. that population which would produce maximum income per head, or per household, from given economic resources. Other definitions of 'optimum' relate to subjective assessments of 'optimum' density or to criteria such as 'national self-sufficiency'.

382. 'Self-sufficiency' is thought of as freedom from dependence on foreign sources of supply for food, energy and the more important raw materials. Britain has not been self-sufficient in this sense for centuries, so that any attempt to calculate the size of population which would be consistent with self-sufficiency is difficult, if not impossible. In the absence of an assessment of the evolution of future technologies it is still more difficult to guess what level of population would be consistent with self-sufficiency 40 or 80 years hence. Moreover, it is not clear on what political assumptions 'self-sufficiency' is to be defined: for example, the level of Britain's population consistent with 'self-sufficiency' on its own would almost certainly be considerably below the level which it could attain within a more or less 'self-sufficient' European Community.

383. Other criteria might be considered but there is no reason to suppose that it is possible to find a single criterion from which an optimum population size could be deduced; nor is there any likelihood that the different criteria which might be proposed would point to anything like the same estimate of optimum population.

384. Many people believe that the present level of population is high enough; some think that a much lower number e.g. 30 million would be better. The projections show that the achievement of a 'target' of 50 million, still less 30 million, over the next 80 years is, to say the least, improbable; and, as our subsequent analysis shows, nobody knows what politically acceptable measures a Government could take to bring about such results. To frame policy in terms of 'targets' which take no account of the in-built momentum of the demographic process, or the uncertainties about the extent to which population growth can be influenced by policy, is neither sensible nor realistic.

385. Thus, there is no single criterion from which one can deduce how big the population should be. We agree with Professor Glass, as cited by

the Select Committee,<sup>1</sup> that the concept of optimum population is impossible to define in terms which provide any useful basis for policy making. There is no presumption, even if such an 'optimum' or 'target' population size could be estimated, that acceptable means could be found of reaching it.

### An attitude to population

386. This does not mean that it is not reasonable to formulate an attitude to population size and growth. In chapter 3 we have tried to assess the implications of future population growth in Britain for a wide range of economic, social and environmental problems. Our analysis suggested that few of these problems can be attributed wholly or mainly to population growth. In some cases the links with population seem tenuous. In others, such as pollution, congestion and the demands for water and public services, by far the largest determinants are rising living standards and increasing industrial production. And our analysis suggests that the resources should be available to provide for the population in prospect at the end of the century, at material living standards a good deal higher than those which we enjoy at present.

387. The implication is that, whether or not one thinks that a population of 55 million in the first decade of the next century would be better than the 64 million at present in prospect, there is no reason to suppose that 64 million would be in any way intolerable or disastrous. Scenarios which suggest that we shall only be able to survive as a nation, or sustain an acceptable quality of life, with a much smaller population by the beginning of the next century, cannot be dismissed as logically impossible. They can, however, be rejected as a basis for policy because—

- (a) they assume the inevitability of the collapse of the present structure of world trade and international relations—an assumption which is at least doubtful;
- (b) there is no conceivably acceptable policy action which would bring about the kind of population changes which such extreme assumptions would require.

388. On the other hand, all our analysis suggests that most of the economic, social and environmental problems which confront us as a nation are likely to be more difficult to deal with the faster the population increases. Almost all the advantages seem to lie in slower rather than faster population growth.

389. We have considered the arguments in favour of a larger, rather than a smaller population. It can be argued that a country's power and influence in the world depend at least in part on its numbers, and that a larger population means a larger market and greater opportunities to enjoy the economies of scale. Furthermore, a stationary or declining population will include a higher proportion of the middle-aged and elderly, and a population with an

---

<sup>1</sup> Paragraph 24 *First Report from the Select Committee on Science and Technology 1970-71 on Population of the United Kingdom House of Commons Paper 379.*

## *Population and policy*

older age structure may be less inventive, dynamic and adaptable to change than an expanding population with a higher proportion of young people.

390. We do not believe that much weight should be given to such arguments. There is little reason to think that our power and influence in the world will be very different in 40 years time whether our population is 60 or 70 million. As part of the enlarged European Community, the opportunities to benefit from the economies of scale will depend on the size of the European market. While a more slowly growing population will contain a smaller proportion of young people, this need does not necessarily mean a less adaptable society and, if one accepts the view that society cannot postpone indefinitely the economic and social consequences of a transition to a stationary population, the hypothetical benefits of a younger age structure can in any event only be enjoyed temporarily. Accordingly we give little weight to arguments in favour of a larger population as against a smaller, or a faster as against a slower rate of increase.

391. Furthermore, the difficulties and disadvantages of a rising population will almost certainly increase with time. To absorb a natural increase of 10 million people by 2011 should not be too difficult: to absorb a further 20 million by 2051 could be much more intractable. This leads us to conclude—

- (a) that a slower rate of increase in population is clearly preferable to a faster;
- (b) that the sooner we can approach the conditions necessary for a sustainable stationary population the better: given the age structure of the population, we should not expect to be able to achieve anything like a stationary state in less than several decades;
- (c) if there were to be a fall in fertility which led, at least in some years, to an excess of deaths over births this should not be a cause of public concern.

## **Implications for future Government policy**

392. If a Government accepts a responsibility for concern with population matters this does not in itself commit it to major changes in policy. In many circumstances a Government which has already accepted in principle a concern for population matters might feel that the situation did not require it to do more than say something like 'we have considered the available information about recent population trends and their implications, and have on balance concluded that at this time they are not such as to require further changes in Government policy'. A statement of this kind would represent, in effect, the first step towards a policy towards population.

393. If a Government were to go beyond this and conclude that it wished to influence the rate of growth, and ultimately the size, of the country's population it would need to consider a hierarchy of possible lines of action, in terms of the effects of such policy changes on other policy objectives and their implications for the freedom of the individual and the privacy of the family.

394. People may have larger families than might be thought desirable on general population grounds because—

- (a) owing to lack of access to information about contraceptive techniques, sufficient advice, or adequate access to supplies of effective contraceptives, they are unable to limit the number of children they have to the number they desire;
- (b) even if they have no more children than they mean to have, they may not have made a reasonable decision because they have not taken into account all the reasonably foreseeable consequences in terms of costs to themselves and to their children;
- (c) they do not take account of the implications of their own decisions about family size on the overall population situation; there is no reason why the sum of individual rational decisions should produce the rate of population growth which the community as a whole would choose;
- (d) the general structure of social security and welfare services, of cash benefits and tax allowances, has the effect of encouraging people to have larger families than they would if they had to pay a larger proportion of the cost of having and raising children.

395. Governments may therefore consider changes in policy which will—

- (a) by extending the scope and availability of family planning services reduce unwanted pregnancies and so reduce the birth rate;
- (b) by informing the public of the facts of the population problem, create a climate of opinion in which people will take their own decisions about the size of family they have in the light of better information about the overall situation;
- (c) seek positively to persuade people of the advantages of smaller rather than larger families;
- (d) alter the balance of social and welfare benefits, in both cash and kind, and of tax allowances, in such a way as to create disincentives to having more children.

We look at each of these possibilities in greater detail.

### **EXTENSION OF FAMILY PLANNING SERVICES**

#### **Unplanned pregnancies**

396. An unplanned pregnancy may be defined as one which takes place when the woman has no wish to conceive. Some unplanned pregnancies will occur to women who have already had as many children as they want; others will occur at an inconvenient time. By no means all unplanned pregnancies lead to unwanted births, for a pregnancy may be accepted and in the event the child welcomed. Moreover desired family size may vary at different stages of a marriage as the social and economic circumstances of families change. Nevertheless most of the first type of unplanned pregnancies which come to term, i.e. those occurring to women who have already had as many children as they want, will represent an unwanted addition to the total number of births. The same is not true of an unplanned pregnancy which occurs at an inappropriate time; in such cases the birth may merely anticipate one which would have taken place later.

## *Population and policy*

397. We have no way of determining the number of unwanted pregnancies of either type. It would not even be right to use the number of abortions as a minimum estimate of the number of unwanted pregnancies of the first type, as an abortion may be resorted to when conception occurs at an inconvenient time and the woman concerned may wish to have more children later. Various studies have tried to determine the total number of live births which might be permanently prevented by completely effective contraception. The resulting estimates have ranged widely; for instance figures of 80,000 and 150,000<sup>1</sup> a year have been put forward, in relation to the past few years when births were of the order of 900,000 a year.

398. The problems of how to elicit and interpret this kind of information are such that we would hesitate to suggest a specific figure. Indeed the number of births which are 'unwanted', and indeed those 'wanted', is something that itself must change from time to time as economic and social circumstances and attitudes to childbearing change. We would nevertheless agree that the evidence points to a significant number of births at present being 'unwanted' and that, given 100% effective contraception applied in every case, they would be permanently avoided.

### **The possibility of family size control**

399. The effect on the birth rate of developing comprehensive contraceptive services cannot be estimated with any precision. Such services are not at present widely available and even where they are provided there has seldom been sufficiently long experience to make it possible to draw definite conclusions. Aberdeen is often cited as an exception to this. It is a city where many and varied services, including free contraceptives and health education, are available for those who wish to control family size, and in which the birth rate is lower than in other Scottish cities. But it is unwise to generalise from limited populations with particular social and demographic features.

400. We have tried to identify the obstacles to contraceptive efficiency and the extent to which they are likely to diminish in any case, or may be reduced by the development of a fully comprehensive family planning service.

#### *i. Methods of contraception*

401. Existing methods of contraception vary in their reliability, their physical, cultural and psychological acceptability, and the degree to which they require personal responsibility and forethought to be effective. Reliability and acceptability are related. Some methods which have the least immediate and obvious side effects may carry the greatest risk of unintended pregnancy. No one method of contraception can be given preferential treatment; each couple must decide on the one most acceptable to their circumstances. Where advice is sought, each case needs to be considered in relation to the circumstances of the individual.

<sup>1</sup> Estimates which have been given of unwanted or 'regretted' pregnancies running at a level of 250,000 a year include the 100,000 or more pregnancies a year which are terminated by abortion.

402. Most existing methods of contraception require a considerable element of personal responsibility, planning and forethought. There are likely to be improvements to existing methods but we have been advised that there are no new methods imminent which are likely to remove the need for continuing responsibility and forethought.

403. Some of the longer-term ideas under consideration include the implantation of a hormone-releasing capsule in women, the possibility of a 'male pill' which would prevent the production or activity of sperm, and the possibility of immunological or endocrinological techniques which would enable a woman to have herself rendered infertile until she took the necessary steps to regain her fertility.

404. This last method, if achieved, would be the most significant of all developments, in the sense that it would require action to achieve fertility and not to prevent it. Such immunological procedures might, however, involve grave drawbacks. They may be of doubtful reversibility and could have unpredictable side effects, both physiological and psychological. Nor can the possibility of 'auto-immune reaction' be ruled out.

405. Whatever the future may hold it must be recognised that if new methods are to work they will do so by having significant effects on the organism, and will be acceptable only after very long and intensive trials. The need for a thorough programme for testing such new methods would probably preclude their adoption for the next 15-20 years.

406. In the shorter term other developments are possible; the 'morning after' pill (medication with hormones before or after intercourse); drugs administered in the post-ovulatory phase of the menstrual cycle to prevent the implantation of a possibly fertilised ovum; a once-a-month menstrual-cycle regulator pill (prostaglandin); menstrual aspiration, by which the contents of the womb are extracted periodically by suction.<sup>1</sup> We make no judgement of the value or availability of these methods, noting only that some of them are already in use. But when they would be practical possibilities, generally acceptable and available, is very hard to judge.

#### *ii. Attitudes to family planning*

407. Most people now approve of the idea of family planning and almost all couples use some form of birth control at some stage in their married life. The main problem seems to be not that people disapprove and never attempt to use any method, but that no method is completely satisfactory. There is a tendency to switch between methods, and many couples use unreliable techniques; there is still considerable use of withdrawal (*coitus interruptus*).

408. While many couples need initial guidance before they decide to visit their doctor or a clinic, some of the obstacles to successful family planning are such that continuing guidance is necessary. Some difficulties, differing at least in degree, are present in all families.

---

<sup>1</sup> This may in law constitute abortion, not contraception.

## *Population and policy*

409. There still remain those for whom some methods of family planning are unacceptable. Other couples, moreover, even though they do not reject family planning as such, seem to find particular difficulty in achieving success in planning their family size. Such couples may be bad managers generally, or fearful or suspicious of authority, of doctors and clinics, just as much as of the courts, the police, and the school. Thus they may cut themselves off from methods which require professional supervision. However it is very rare for any couple to manage perfectly—forethought and precise care do not necessarily go hand in hand with the expression of emotional and sexual feelings. Many couples seem to find some barrier between themselves and the source of advice which they need, however small that barrier may be. Some take risks; and emotion and irrationality are not confined to any single group.

### *iii. Knowledge about contraceptive techniques*

410. Various studies suggest that 90% or more of families are aware of the possibility of family planning but this does not necessarily mean that their knowledge is adequate to enable family planning to be achieved successfully. Research has shown that significant numbers report having 'taken a chance' because they misunderstood the degree of risk in unprotected intercourse, or because they on occasion failed to take any precaution from dislike of their usual method of contraception. American surveys indicate that contraceptive failure or risk-taking is less likely once a couple have achieved the family size they want, so that family planning is likely to be more effective in relation to family size than to individual births. The same could be true in Britain.

### *iv. Advisory services*

411. A recent survey undertaken by the OPCS (to be published shortly) examines a variety of sources of advice which are favoured by different groups of women. For many women clinic services are preferred. On the other hand 16% of married women of childbearing age were attending their general practitioner for family planning advice and of women who were not at the time receiving professional contraceptive advice nearly one-half said they would go to their general practitioner if they were to seek such advice, compared with one-third who would consult a clinic. Even when allowance is made for a progressive narrowing of this gap (among women married in the period 1966-70 the proportions preferring each source were equal) and allowing for the fact that as clinics become more widely spread they should appeal to a greater number of women, the general practitioner is the person to whom a considerable number of women would rather go. These choices were expressed in relation to requests for advice about available contraceptive methods; there would seem to be no reason to believe that these attitudes would change markedly if methods of contraception were to change.

412. Individual members of the health professions have their own responsibilities for those for whom they care and these determine their priorities. Improved services and changing attitudes are leading to a greater availability of advice and supplies, but there are still considerable gaps, as the following conclusions show.

- (a) *Clinics.* Of a group of women surveyed in 1970, one-quarter had to spend 2 hours or more on their last visit, and three-quarters said that the clinic was held only one or two days a week. There have been significant improvements since then but the general pattern still leaves much to be achieved.
- (b) *Training of medical students.* Of more than 400 hospital consultants in obstetrics and gynaecology interviewed in 1971 only 2% thought the training received in contraceptive techniques by young junior doctors before coming to their department was good, and nearly three-quarters described it as insufficient.
- (c) *Hospital advice.* In 1967-68 only 12% of a sample of mothers interviewed after childbirth said that they had had any discussion of birth control methods with a doctor at hospital. Opportunities to offer help are still being missed because of the lack of facilities in hospitals.
- (d) *General practitioners.* Between 1967-68 and 1970-71 the proportion of general practitioners who said that they would raise the subject of birth control with an unmarried woman who had had a baby increased from one-half to three-quarters. At the later date one-third said they would raise the subject with a married woman with 3 children even if she had no social or health problems.

413. Hospitals and health centres are clearly suitable places for family planning clinics. Most women of childbearing age become patients in maternity wards at one time or another and this should provide an opportunity to offer them professional advice on contraceptive techniques. Members of the health professions (health visitors, midwives, doctors) who visit families in their homes are equally well placed to give advice on family planning.

414. Family planning advice is not and need not be restricted to normal health services facilities or to advice from members of the health professions, in homes (domiciliary services), general clinics and consulting rooms, if other methods are more suitable. For example separate clinics may be preferred by the unmarried; in the survey referred to above questions about different sources of contraceptive advice showed that of those unmarried women who did not specifically reject the idea of pre-marital sexual intercourse one-half favoured a separate clinic for the unmarried (17% were in favour of an ordinary clinic and 28% of their general practitioner).

#### v. Financial arrangements

415. There is insufficient evidence on which to judge the effect on the birth rate of choosing to make all supplies either freely available or on NHS prescription in addition to making advice, etc. freely and comprehensively available. There will always be some for whom free supplies are clearly needed, e.g. those with low incomes and those for whom free supplies are necessary to overcome their objections or inertia. It would seem clear that the effect of free supplies on the poor and large families would be greater than the effect of NHS prescription supplies on the majority. Certainly if supplies were universally available on NHS prescriptions many couples would benefit who had already shown themselves willing to adopt family planning on their own, by paying for their own contraceptives.

416. On the other hand—

- (a) Thirty pence a month for the contraceptive pill (or £1.50-£2.00 if it were dispensed on a 6-month prescription) could be a matter of some concern for families who would not normally be regarded as low income families.
- (b) Family planning is at present regarded as something outside general health care. There is still a lot of ignorance and misunderstanding, and anything which made people regard birth control as a normal part of medical advice might encourage couples to seek advice who had not already done so. This should improve contraceptive efficiency among all groups in the population. Treating family planning like other NHS services should help to promote such attitudes.
- (c) Local health authorities which have added free supplies to existing advisory services have reported increases in numbers seeking advice (30%, 50% even 100% increases). It is difficult to disentangle the effect of free supplies from the effect of the publicity given to their provision. In one area at least publicity alone has had an effect on attendances, but it is possible that some of this increase in attendance will have been the result of provision of free supplies.

### **The effect of extending family planning services**

#### *i. Fertility*

417. An expansion of the family planning services was announced by the Secretary of State for Social Services on 12th December 1972 (see Appendix 5). Briefly, free services of advice and prescription will be provided to everyone who wants them and free supplies and equipment to those in financial need, to some people on social grounds, and to every woman in the 12-month period after childbirth or abortion. This should have a significant effect on the number of unplanned pregnancies by lowering the obstacles which at present stand in the way of complete contraceptive efficiency.

418. Although the development of comprehensive family planning services would further reduce any obstacles in the way of more effective contraception it could also be an influence making for higher fertility, either by changing attitudes to family formation, considered below, or by tending to encourage promiscuity, considered in paragraphs 427 et seq.

419. It is possible that the climate of opinion and practice might be so altered by a universally free service that attitudes to family formation itself might be influenced. Birth spacing might be affected as well as the prevention of further births. While we cannot judge the exact nature or size of this we note that not only 'unwanted' but also wanted and planned pregnancies could be affected—in short, total births. The level of what is 'wanted' is undoubtedly related, in however complex a way, to the certainty or ease with which the 'wanted' can be achieved. The attitudes and decisions of individuals may well be affected by changes in the general social climate if the family planning services become a normal and integral part of health care.

## ii. Health

420. The risks from the contraceptive pill are smaller than the risks of pregnancy. Such risks as exist can be reduced by professional examination and advice which could suggest other methods for women for whom the pill was likely to be an above-average risk. Contraception can have a beneficial effect on the health of mothers and their children and in consequence on the well-being of the family. It is, of course, an essential health measure for women of childbearing age who suffer from certain specific diseases. Of equal importance in health terms is the fact that contraception gives an ability to achieve the desired size of family during the most favourable ages for childbearing, with the recommended minimum intervals of about two years between each birth. It has also an important role to play as part of genetic counselling, where there is a known risk of the transmission of an inherited condition, in preventing the birth of a handicapped child. Repeated pregnancies in rapid succession put a severe strain on the mother's mental and physical health.

421. Several studies have shown that the risk of maternal and infant death and illness is greater when the mother is under 20 years of age or over 35. The perinatal mortality survey of 17,000 births carried out in 1963 by the National Birthday Trust Fund confirmed an increasing perinatal mortality with rising maternal age, with women over 40 having double the average risk. The effect of maternal age on the outcome of the pregnancy is conspicuous in the case of Down's Syndrome (Mongolism) which accounts for about one-quarter of all severely mentally handicapped children. While the incidence is about 1 in 600 live births overall, among babies born to women aged 40 or over it is of the order of 1 in 60.

422. Maternal age and parity have a significant correlation with mortality and illness. Their combined effect on maternal mortality is shown in Table 32.

TABLE 32

## Deaths per million maternities by age and parity, 1967-69

Age	Parity*				
	1	2	3	4	5+
Under 20	129.5	667.1	—	—	—
20-24	115.6	79.2	123.0	177.8	312.8
25-29	219.9	68.1	123.6	102.9	411.4
30-34	240.0	200.0	192.2	293.0	404.3
35-39	615.6	347.5	435.8	158.2	726.0
40+	870.7	415.7	510.7	659.8	789.5

Source: *Report on Confidential Enquiries into Maternal Deaths in England and Wales in 1967-69.*

\* Parity—the number of previous pregnancies of 28 weeks or more duration, no matter what the outcome, plus the fatal pregnancy whatever its duration.

423. We must also mention, but have not thought it necessary to seek to quantify, the effect of better family planning on the number of abortions, and therefore on the possible mortality and morbidity effects of abortion.

*iii. Social disadvantage*

424. The likely disadvantages of being born illegitimate are well documented. The following quotation<sup>1</sup> is a valuable comment on the relative disadvantages experienced by legitimate children conceived pre-maritally:

'The social and economic problems created for the mother responsible for bringing up an illegitimate baby by herself need little elaboration in this Report because they are so widely known. What is more relevant to the present situation in which pre-marital conception is so high and is followed by marriage amongst the under 20 group, is the disproportionately high contribution that such marriages make to the rapidly increasing divorce rate. This rate is much higher than when marriage occurs later, in spite of the fact that the trend to marry solely because of the pregnancy is much less than formerly. In 1960 the rate of divorce per 1,000 married women 5 years after marriage was 9.1 in those marrying under the age of 20, compared with 4.5 for those marrying between the ages of 20-24, and 2.8 for those marrying between 25-29. The comparative figures for 1969 were 20.8, 9.8 and 6.5. At 10 years after marriage the relative figures are 15.2, 7.4 and 4.3. These figures reflect that the divorce rate is more than doubled in those marrying under 20 compared with those marrying later. The very high contribution to total divorces from those marrying under 20 is further emphasised by consideration of the actual totals. In 1969 out of a total of 51,310 divorces, 20,090 were in the cases of those marrying under the age of 20. It must give rise to great concern that so many children are at risk from the effect of broken parentage at an age which may affect their own parental stability.'

*iv. The moral issue*

425. There are two broad areas of concern. First, should the State concern itself in decisions about family size and methods of implementing those decisions, even if it does so only with consent? Second, should the particular method of State intervention, provision of comprehensive contraceptive services, be resisted because it may encourage a reduction in moral standards?

426. Although the first of these can be posed as a moral issue it has practical implications. If it is accepted that the needs of a population policy require the development of fully comprehensive services it is relevant that the National Health Service (therefore the Government) is virtually the only 'employer' of the professional men and women who will provide most of these services. Without involvement of the Government therefore the necessary services will not be provided. To say this is in no way to disparage the value of the work of the voluntary family planning organisations. These organisations are themselves among the first to accept that comprehensive services can only be provided under the aegis of the National Health Service. The Director of the

<sup>1</sup> Report of the Working Party of the Royal College of Obstetricians and Gynaecologists on 'Unplanned Pregnancy' (Chairman—Sir John Peel).

Family Planning Association has stated;

‘The Association’s basic policy for clinic and domiciliary contraceptive services remains steadfastly to hand over the responsibility for and management of these services as quickly and as smoothly as possible to the public authorities.’<sup>1</sup>

427. Again the second question has practical and indeed demographic implications. If comprehensive family planning services were to encourage more pre-marital and extra-marital intercourse there might be a greater risk of more children being born.

428. One group who considered this was a working party of the Royal College of Obstetricians and Gynaecologists. They concluded that there had been an increase in pre-marital sexual intercourse but they were unable to regard this as being due mainly to the availability of contraception.<sup>2</sup>

Quoting the Family Planning Association’s evidence to them;

‘This [the mass media’s less highly moral attitude to intercourse among the single] is obviously due in part to the availability of a highly reliable method of birth control with oral contraceptives, which removes the fear of an unplanned pregnancy which might previously have acted as a deterrent to sexual experiment.’

the Working Party commented:

‘The latter sentence is a highly significant one, but it is open to question whether it is the availability of contraception which is the main reason for the increase in pre- and extra-marital intercourse. The facts suggest also an alteration in moral and ethical standards amongst the population at large, and contraceptive availability is only one factor.’

And they concluded (conclusion 7, page 83);

‘We received a great deal of evidence to explain the increasing tide of sexual permissiveness in teenagers, and consequent unplanned pregnancies. There are great pressures on the young to experiment and emulate adult behaviour from the mass media of television, films, plays, magazines and books. The examples portrayed by these means from the adult world do not encourage a more responsible approach by the adolescent. It also is thought that sexual permissiveness and unplanned pregnancies are not due so much to ignorance or too much knowledge, as to a decrease in parental responsibility and control, and increased unsupervised leisure. There is a general cultural failure to relate the emotional and physical aspects of sex and to see them in the context of moral and social responsibility.’

429. It is worth noting that the rise in proportion of maternities conceived out of wedlock by a long way pre-dated the time when the pill, the most effective form of protection, became generally and widely in use i.e. the second half

<sup>1</sup> *The Director’s Report in the Annual Report of the Family Planning Association 1971–72.*

<sup>2</sup> *Report of the Working Party of the Royal College of Obstetricians and Gynaecologists on ‘Unplanned Pregnancy’.*

of the 1960s. The percentage rose steadily from 11·1 in 1955, the lowest point since the war, to 17·6 in 1968, and the increase in illegitimate births during the 5 years 1962–67 (i.e. up to the Abortion Act) was smaller than in the previous quinquennium.

430. Survey results made available to us by the Department of Health and Social Security suggest that only 6% of the unmarried women interviewed were using professional family planning services (clinic or GP) at the time of the survey in 1970, including only 1% of those aged 16 or 17. These figures are much lower than the proportions of 18 year olds whom Schofield found in his survey of 1964 to be sexually experienced<sup>1</sup> (since when teenage sexual behaviour has probably moved on somewhat; the survey referred to suggestions that the incidence of sexually experienced teenagers has gone up by about one-third in that time). In 1964 the pill was not available to teenagers at all, and the form of contraceptive most commonly used was the sheath.

431. The easy availability of the sheath has been the one constant factor in the birth control scene. This, coupled with the great disparity between the numbers of unmarried who use professional family planning services and the numbers who engage in sexual intercourse, suggests that the increase in the family planning services has not been a significant factor in the rise in pre-marital sexual experience.

432. The reader must decide for himself whether the development of family planning services will encourage promiscuity. On balance we think it would not. No one concerned with these matters can fail to try to make up his or her mind on the moral issues. They are of course much wider than the question of a possible and unproven effect on sexual morals. On this narrow issue itself the ready availability of contraceptive advice and counselling may encourage sexual responsibility. From a wider viewpoint, while unplanned pregnancies do not necessarily lead to unwanted children, the prospect that more effective contraception will in due course prevent at least some abortions, and will mean that fewer children will be stigmatised by illegitimacy or otherwise deprived of opportunities for a full life, must be taken into account.

v. *Venereal disease*

433. We have sought advice on the possibility that an increase in the availability of family planning services, with its removal of many of the risks of pregnancy, would encourage the further spread of venereal disease, particularly gonorrhoea; and that increasing preference for the pill in place of the sheath (which might offer some physical protection) might exacerbate the situation. Such evidence as we have suggests that the increase in sexual activity among those already promiscuous may increase the risk of their contracting VD. It is difficult to determine whether this has implications for stable relationships.

434. One of the most difficult obstacles to overcome in reducing the incidence of VD and in limiting its spread is the difficulty of achieving an understanding both of the risks and of the possibility of curing it. Greater knowledge and more

---

<sup>1</sup> M. Schofield; *The Sexual Behaviour of Young People*, 1965 pp. 33/4.

open discussion of sexual matters, perhaps the result of education for contraception, might of itself help in the control of these diseases.

*vi. Education*

435. Effectiveness of contraception depends on more than a knowledge of contraceptive techniques. To be successful this knowledge must be linked to knowledge of the basic essentials of the psychology and physiology of sexual relationships. This suggests that there should be included in sex education of the public (e.g. in courses for prospective parents, pre-marital courses, courses for adolescents and courses for school pupils of appropriate age) not merely an indication of the importance of family spacing and family limitation, but also some information about contraceptives and contraceptive techniques. In respect of children and adolescents it is desirable that sex education—including contraceptive education—should be given as an integral part of general health education. The main responsibility will however continue to lie with parents. To be fully effective all this education should go much wider than the biological and the mechanical, and should be an integral part of telling young people about personal relationships and moral responsibilities.

### **Sterilisation**

436. Sterilisation has until recently been used mainly on medical grounds, particularly in cases where other methods of contraception have failed. One-fifth of abortions carried out in the National Health Service in 1971 were coupled with sterilisation. It is said that it is becoming increasingly common for couples to use sterilisation to give effect to a conscious decision to have no more children. To avoid the forethought and planning required (and possibly the long-term risks involved) in contraception, or to avoid running the risk of abortion, they may choose sterilisation of the husband (vasectomy) or of the wife.

437. When sterilisation becomes available it creates its own 'demand'. Very often by removing the risk of pregnancy it improves marital happiness, but there may be cases in which there is a possibility of consequential risk to the stability of the marriage. These risks can be reduced if a decision on sterilisation is taken only after considered advice and careful consideration.

438. Since sterilisation should be a decision based on individual circumstances and the needs of a particular marriage it would be wrong to urge sterilisation on individuals on general population grounds. It may often be advised by a medical practitioner on clinical grounds as a preferable form of contraception. But, because of the other possible effects, more general reasons for persuasion—the social, political, or moral grounds—should not be used, though it may be thought legitimate and desirable that members of the public should be made aware of the existence of facilities and of the nature of the procedures.

439. Sterilisation in both men and women is at present largely irreversible, though the possibility exists of improved techniques to achieve reversibility. Provided, however, that the right kind of advice is available and is given in

## *Population and policy*

each case we doubt whether policies need be affected by whether or not the operation is reversible.

440. The provision of facilities to meet more requests for sterilisation would not in itself be a new departure of policy, though it would require some reallocation of resources and people trained and willing to undertake the operations. It would seem to be an efficient way of helping those families who wished to use this kind of method to limit the size of their families. Further developments should be accompanied by a recognition of the need for services which provide the right sort of advice, and where necessary the development of those services. We do not believe the situation requires an expansion of sterilisation services primarily for reasons of population policy.

## **Abortion**

441. The Abortion Act 1967 made abortion legal on specified criteria and under certain institutional safeguards, for reasons which are related to the individual circumstances of the pregnant woman and/or her family. There is no provision within the Act which would make abortion legal for reasons related solely to the size of the national population.

442. The present working of the Act is such that there are considerable variations in the number of women who succeed in obtaining abortions in different parts of the country. The latest available regional analysis (1970) shows that in regions with the highest abortion rates, (that is the proportion of women resident in the region obtaining an abortion, whether in that region or another) there are 10 to 11 abortions per 1,000 women of childbearing age. In regions with the lowest rates there are 4 to 5 abortions per 1,000 women of childbearing age (see Appendix 6). To some extent these differences may be explained by demographic factors, but it is fairly clear that the availability of facilities is also a significant factor. Since the abortions in the higher rate regions were within the terms of the Act, if the facilities available in every region approached more closely to the facilities in those regions the effect on total terminations would almost certainly be significant.

443. We have assumed that national policies on abortion will continue to be determined within the existing Abortion Act, as modified in its working by such recommendations of the Lane Committee<sup>1</sup> as may be implemented. In present circumstances we do not think that special steps need be taken to encourage the development of abortion techniques simply because of possible concern about population trends.

444. It has been suggested that if abortion were more readily available this would lead to a neglect of contraception and a full scale move towards abortion on demand. There is no evidence to support this. Contraception is always to be preferred to abortion.

---

<sup>1</sup> Committee under the Chairmanship of Mrs. Justice Lane appointed in 1971 to consider the working of the Abortion Act 1967.

### **Cost of developing family planning services**

445. Any additional costs arising from the expansion of sterilisation and abortion facilities would stand to be justified on health and not on population grounds. We have looked at the likely cost of developing contraceptive services to a level at which everyone who wanted to use these services would be able to do so. This is on the assumption that present methods are used and that services are provided by general practitioners, hospitals, clinics and domiciliary services, with contraceptives free to some groups, and on prescription charge arrangements to the rest. Estimates were made for us by the Department of Health and Social Security in the light of survey results indicating how many people might avail themselves of the various services, and which would be chosen if all were readily available. We understand that the eventual annual costs of fully developed contraceptive services would be of the order of £30 million;

- (a) provision of clinic, hospital, GP, etc. services; domiciliary services and advice; contraceptives for medical cases; education; training of staff . . . £13 million.
- (b) free contraceptives for supplementary benefit and family income supplement families, plus those families which might not qualify in the poverty group but where free contraceptives might be essential to overcome inhibitions or obstacles . . . £2 million.
- (c) contraceptives for women in the first year after childbirth or abortion . . . £2 million.
- (d) provision of contraceptives under prescription arrangements for all other couples who want them<sup>1</sup> . . . £13 million.

(These are all United Kingdom figures at 1971 prices.)

446. The development of the services announced by the Secretary of State for Social Services on 12th December i.e. items (a) to (c) of the above table could be expected to cost £17 million eventually, compared with a present cost of about £4 million a year. Thus the gross addition to public expenditure of developing fully comprehensive services would be of the order of £30 million. The ultimate cost levels (either of £17 million or of £30 million a year) might not be reached for 5-7 years.

447. This would not all be a net addition to public expenditure. A reduction in births would also mean a reduction in public expenditure associated with births e.g. the cost of confinements. Little if any net increase in public expenditure need in the long run be implied. In so far as one can isolate an economic case for the provision of full family planning services it must rest on the relationship between population and living standards discussed earlier in this report and not on the estimated magnitude of such marginal changes in future public expenditure as might result from making the provision. While it can be argued that this kind of calculation is an obvious subject for cost-benefit analysis, we have not pursued such an approach, because such an analysis involves too many facile value judgements.

<sup>1</sup> On the assumption that of the rest of the population of women 'at risk' some three-quarters would use NHS-provided services (a generous assumption considering those who will cope privately, or continue to use no artificial method, or practice coitus interruptus).

### **Family planning as an adjunct of population policy**

448. As an adjunct of a population policy we would see the need to accept the following aims for family planning, all but the last of which are now accepted Government policy;

- (a) Research into ways of removing the constraints on fully effective contraception by individuals.
- (b) Contraception to become a part of general health care; general practitioners (who know the family situation), hospitals, maternity wards and clinics, community-based clinic and domiciliary services, nurses and health visitors should all be involved, recognising any extra work load which might fall on them. A programme for training professional (and non-professional) workers to advise on family planning. The kind of family planning programme which is envisaged here would involve the active co-operation of all members of the health professions, including those who reject some methods on grounds of conscience; the last group should nonetheless be ready to refer enquiries about these methods to colleagues who would help further.
- (c) Services to be developed and administered responsively to changing needs, widely available for all who want them.
- (d) A longer term process of education, both in schools and integrated with general health education, and with education for living generally, to inform the public at large of what is possible and what services are available.
- (e) Contraceptive supplies and equipment should be available to all as an integral part of the National Health Service.

## **OTHER POSSIBLE ELEMENTS IN A POPULATION POLICY**

### **Informing the public**

449. Some of the views expressed in recent discussion would not, we believe, have been put forward if the public had been better informed of the facts and their demographic significance. A more informed discussion of population matters is a necessary basis for the development of an acceptable attitude towards population and other Government policies.

450. The Government publishes a great deal of information about population changes but the public is not in general well-informed about the facts of the situation. This suggests that the Government should devote more effort to the public presentation of the facts about Britain's population. This will require not merely the wider publication of statistics in a more understandable form, but the preparation of commentaries on the interpretation of current trends which will be intelligible to the general reader and form the basis for more informed public discussion. A good deal of attention is paid to the presentation of facts about the economic situation; the same kind of attention could well be paid to the presentation of facts about the population.

451. In addition to the provision of better general information, there is also a more specific need for better information on and education in responsible parenthood. For younger people such instruction and information can in part

be provided within the formal educational system; but it also involves much wider questions of moral responsibility and has implications for parents in the way in which they bring up their children and conduct their own lives. The Government can only play a limited role in this field. Much more will depend on the development of individual and social attitudes. But the lead which the Government can give in the formation of these attitudes could be influential: official views on sex and contraceptive education, and the provision of family planning advice and counselling through the health and social services, can exert considerable influence on these attitudes.

### **Persuasion by the Government**

452. We have considered whether the Government should adopt a conscious policy of trying to persuade people to have fewer children and have concluded that it would be wrong to do so at the present time. First, as discussed above, the Government can do no more than express its attitude to population growth in the most general terms. Secondly, as the reference to models of family size consistent with stationary population shows, there are many different patterns of individual family sizes which are consistent with a stationary population. This makes it very difficult to prescribe a 'right' size for individual families. Some people make particularly good parents and it may be to the general advantage that they have larger families. Thirdly, no-one knows how a deliberate campaign to persuade people to have fewer children could effectively and acceptably be mounted, nor is there any means of assessing what the effects of such a campaign could be, either on the number of children, or, perhaps more important, on the personal and social relations of individual families.

### **Social and fiscal policies**

453. The tax system and the provision of social services and education reduce the cost to the individual family of bringing up children. In so far as people's decisions about the number of children they wish to have are affected by consideration of the number which they can afford to bring up at a level conventionally considered as appropriate, it would in principle be possible to influence the rate of population growth by changes in the tax system and in social services provision. The analysis in chapter 2 has demonstrated how little is known about the importance of economic factors as determinants of fertility, so that nobody knows what the impact on family size of such changes would be. Certainly no-one could say what sort of measures would be most likely to achieve particular results. Appendix 7 shows that the experience of countries which adopted policies designed to encourage people to have larger families by providing generous family allowances and birth grants, and by other fiscal means, does not suggest that measures to reduce the cost of having and bringing up children had any clear effect on family size. It is not clear whether measures to increase the cost of bringing up children would be more effective in reducing family size.

454. Measures to increase the cost of bringing up children are bound by their nature to be to the disadvantage of children, and in particular of the children in larger families. There is thus a clear conflict between the use of the fiscal system and the social services as an instrument of social welfare and their

## *Population and policy*

use as a means of influencing population growth. For this reason, as well as the uncertainties discussed in the previous paragraph, we do not consider that this kind of policy action would be desirable or appropriate at the present time.

455. If average family size were to remain well above replacement level in the long term, a situation could arise where the use of persuasive techniques or more direct fiscal measures (or both) to influence population growth might have to be considered. It is therefore important that research into the determinants of family size be pushed ahead, so that if, at some stage, a Government decided that such measures were necessary, it would have enough background information against which it could frame appropriate and acceptable fiscal and social policies.

## **Other measures**

456. If Governments were to consider that measures of this kind are unlikely to achieve the results they want, they could go further, as some Governments in less developed countries with very pressing population problems have done. They could consider introducing direct financial or other incentives for family limitation, including the encouragement of sterilisation (including vasectomy) for parents with families above a certain size.

457. Finally, Governments may find it necessary to look at their attitudes to emigration and immigration in the light of their attitude to population growth.

## **Wider implications**

458. There is a good deal of evidence to suggest that one of the factors associated with family size is employment among women and in general opportunities for women in society outside the immediate family circle. Where there are more employment opportunities for women family size tends, on average, to be smaller. If, for whatever reason, on average people have rather smaller families than they do at present, the number of women who wish to take jobs at any time may well be larger, and the number of years which a woman devotes wholly to bringing up her family may be fewer. In other words, a movement towards an average family size consistent with a stationary population is likely to be associated with an increased demand by married women for employment opportunities and other opportunities for social participation outside the immediate family circle. The number of women with full- or part-time jobs outside the home has increased very substantially since the beginning of this century and this has been associated with changes in the relative roles of men and women in society and the family. These interactions are likely to continue to be important as society moves towards a stationary population. Such questions go far beyond the scope of this report, and, given the time at our disposal, we have not attempted to reach conclusions on them. But we would emphasise that we are very conscious of these questions and that they have very wide implications for the development of society and for policy.

## **PART III**

### **APPENDICES**



## CONTENTS

	<i>Page</i>
<b>Appendix 1</b> First Report from the Committee on Science and Technology.	127
<b>Appendix 2</b> Acknowledgements.	128
<b>Appendix 3</b> The benefit of a small population in times of high food prices.	129
<b>Appendix 4</b> Commission on the Constitution.	131
<b>Appendix 5</b> Expansion of family planning services.	132
<b>Appendix 6</b> Abortions in England, Wales and Scotland.	133
<b>Appendix 7</b> Population policies: experience in other countries.	134



**APPENDIX 1**  
(see Foreword paragraph i)

**EXTRACT FROM FIRST REPORT FROM THE SELECT COMMITTEE ON  
SCIENCE AND TECHNOLOGY SESSION 1970-71:  
POPULATION OF THE UNITED KINGDOM**

**‘Conclusion**

The Government must act to prevent the consequences of population growth becoming intolerable for the every day conditions of life.

**Recommendation**

32. We, therefore, recommend setting up, as an integral and permanent part of the machinery of Government, a Special Office directly responsible to the Prime Minister, with the following duties:

1. To co-ordinate and improve the study of United Kingdom and world population trends, including internal and external migration, and their consequences.
2. To extend this study to the inter-relation between population and such major issues as food supplies, natural resources, economic growth, and the environment.
3. To appraise in the context of population policy the plans of the main Departments of State for housing, water supplies, food, transport, fiscal policy, employment, education, health services and other relevant matters.
4. In the light of these studies and appraisals to advise the Government on population policy.
5. To publicise the effects of population levels and their consequences, the role of family limitation and socially responsible parenthood.

33. We consider that the subject of the Report affects the whole of Government. The direct responsibility for carrying out our recommendation should, therefore, rest with the Prime Minister. We ask that he should make an annual Report to Parliament on the work of the Special Office and that parliamentary time be given, annually, for its debate.'

(House of Commons Paper 379, 5th May 1971)

## APPENDIX 2

(see Foreword paragraph x)

### ACKNOWLEDGEMENTS

We are grateful for help received from the following organisations and individuals. They should not be regarded as agreeing with all or any of the opinions or conclusions stated.

Ministry of Agriculture Fisheries and Food  
Department of Education and Science  
Department of Employment  
Department of the Environment  
Foreign and Commonwealth Office  
Department of Health and Social Security  
Office of Population Censuses and Surveys  
Home Office  
Department of Trade and Industry  
Scottish Office  
General Register Office (Scotland)  
Commonwealth Migration Society  
Conservation Society  
International Planned Parenthood Federation  
Medical Research Council  
Social Science Research Council  
Royal Commission on Environmental Pollution  
Mr. E. A. J. Alment  
Mr. S. A. Arlott  
Professor S. A. Barnett  
Dr. P. M. F. Bishop  
Professor W. F. Bodmer  
Professor W. Brass  
Mr. C. Brook  
Dr. Ann Cartwright  
Dr. E. Colin-Russ  
Professor D. V. Glass  
Dr. W. G. Harding  
Mr. C. Langford  
Professor K. Mellanby  
Dr. I. A. G. MacQueen  
Lady Medawar  
Sir Peter Medawar  
Dr. Dorothy Morgan  
Dr. C. S. Nicol  
Dr. J. Peel  
Dr. M. Potts  
Mr. R. M. Prothero  
Sir David Renton  
Mr. M. Schofield  
Mr. A. S. D. Service  
Dr. R. V. Short  
Dr. G. I. M. Swyer  
Mr. G. Teeling-Smith  
Professor J. M. Thoday  
Professor A. C. Turnbull  
Dr. G. R. Venning  
The Rt. Rev. the Bishop of Willesden.

## APPENDIX 3

(see chapter 3 paragraph 275)

### THE BENEFIT OF A SMALL POPULATION IN TIMES OF HIGH FOOD PRICES

1. This country obtains part of its food from home sources and part from overseas. The larger our population the greater will be the share of imports in total consumption. It follows that if the cost of imported food were to rise (because of a rise in world food prices) we should be worse off to an extent that would be the greater, the larger our population. In this Appendix we try to estimate how much we might gain in these circumstances from a smaller rather than a larger population. We do so in terms of a very simplified example and consider an extreme change in imported food prices.

2. We start with a country, such as ours, with 3% of its output in agricultural food production, this constituting half of food consumption, the other half being imported. Let us call all other production, including services, manufactures. We need take no account of the fact that some manufactures are exported to pay for imported manufactures as this is not relevant to our calculation. Let total output be 100 units, a unit being a sum of money at constant prices. Thus total output is 97 units of manufacture plus 3 units of food, 3 units of manufactures being exchanged for 3 more units of imported food. We assume that there are no economies or diseconomies of scale in manufacturing.

3. Now suppose that the price of imported food becomes 5 times more expensive in terms of manufactures. In order to maintain food imports, exports would have to increase by 12 units (paying 15 rather than 3 units of manufactures for 3 units of food) and national income is thereby reduced by 12%.

4. In practice the rise in imported food prices would lead to a reduced dependence on imported food. It would be economic to divert resources into home food production until the cost of additional output equalled the cost of imports. This point might be reached, let us say, when a doubling of the input increased output by 50%. In that case a sacrifice of 3 units of manufactures would have yielded  $1\frac{1}{2}$  units of additional home produced food. In order that the total food available should be still 6 units, imports would have to be  $1\frac{1}{2}$  units, these being purchased with  $7\frac{1}{2}$  (5 times  $1\frac{1}{2}$ ) units of manufactures. Thus  $4\frac{1}{2}$  more units of manufactures would have to be exported. Taking this in conjunction with the additional 3 units of manufactures sacrificed in order to increase home production, we see that the quantity of manufactures available for home consumption would have fallen by  $7\frac{1}{2}$  units. National income, in other words, would have fallen by  $7\frac{1}{2}\%$ . The situation before and after the food price rise and the consequent adjustments are summarised in Table 33.

5. Let us now consider how matters would differ if population were 20% smaller and food consumption was only 4.8 units. Suppose imported food prices rise 5 times with food output conditions remaining the same as with the larger population despite the fact that rather more land may be available for agricultural purposes. Before import prices rose, 3 units of food were being produced at home at the sacrifice of 3 units of manufacture. After the rise in imported food prices, home food output is increased by 1.5 units at the sacrifice of 3 additional units of manufactures. Exports of manufactures are however now rather less, 1.5 units to pay for the remaining 0.3 units of food needed from abroad, instead of 1.8 units. Total manufactures available for home consumption have therefore fallen by 2.7 units. National income has fallen from 80 to 77.3, therefore by 3.4%. With the larger population the reduction was 7.5%. Even on our assumption of a very marked rise in imported food prices the gain from having a smaller population is therefore very limited, being equal, at 4.1% of income per head, to less than two year's growth on any reasonable estimate of normal productivity improvement.

6. On the other hand, there would be a similar effect if prices of other primary products—such as minerals—were also to rise sharply. Our net imports of basic materials, including those embodied in manufactures, probably cost more than our food and drink imports at present, but the scope for replacing them from home sources would be very limited.

7. We therefore conclude that although in the event of a rise in world food and material prices this country would be better off with a smaller population, the magnitude of the gain would be quite small, even if the price rise were very large.

TABLE 33  
Summary of model

M = Manufactures  
F = Food

	Larger population	Smaller population
Initial position		
Production	97M + 3F	77M + 3F
International trade	3M for 3F	1.8M for 1.8F
Income/expenditure	94M + 6F = 100 units	75.2M + 4.8F = 80 units
After 5-fold food price rise		
Production	94M + 4.5F	74M + 4.5F
International trade	7.5M for 1.5F	1.5M for 0.3F
Income/expenditure	86.5M + 6F = 92.5 units	72.5M + 4.8F = 77.3 units
Loss of income/expenditure	7.5 units or 7.5%	2.7 units or 3.4%

Source: Population Panel.

Note: Units are units of value at initial position prices.

**APPENDIX 4**  
(see chapter 3 paragraph 356)

**COMMISSION ON THE CONSTITUTION**

**Terms of Reference**

To examine the present functions of the central legislature and government in relation to the several countries, nations and regions of the United Kingdom; to consider, having regard to developments in local government organisation and in the administrative and other relationships between the various parts of the United Kingdom, and to the interests of the prosperity and good government of our people under the Crown, whether any changes are desirable in those functions or otherwise in present constitutional and economic relationships; to consider, also, whether any changes are desirable in the constitutional and economic relationships between the United Kingdom and the Channel Islands and the Isle of Man.

## APPENDIX 5

(see chapter 5 paragraph 417)

### EXTENSION OF FAMILY PLANNING SERVICES

Statement by the Secretary of State for Social Services: 12th December 1972

My right hon. Friends, the Secretaries of State for Wales and Scotland, and I have carried out a comprehensive review of the provision for family planning services within the National Health Service. We have concluded that a substantial expansion is needed if the numbers of unwanted pregnancies are to be reduced. With modern contraceptive methods available there should be fewer abortions and much less of the unhappiness and ill-health which results from unplanned pregnancies.

There are three areas in which we need to improve our family planning service—advice, education and free supplies for those who need them.

First my right hon. Friends and I propose to expand the family planning advice services, which from April 1974 will all be the responsibility of the new National Health Service authorities, so that a comprehensive service of advice is readily available free of charge to all who wish to have it. There will be more clinics, more easily accessible, giving free advice on contraceptive methods, and the domiciliary services will be further expanded to enable all who wish and need advice in their homes to receive it. More emphasis will be placed on the offering of advice and where appropriate treatment to patients in hospital, particularly maternity and abortion patients.

Many people will prefer to consult their general practitioners. At present they receive full advice and services under the National Health Service only where there is a medical need for contraception. I therefore propose to enter into discussions with the medical and pharmaceutical professions to see whether satisfactory arrangements can be agreed with them under which the fees which general practitioners may at present charge National Health Service patients who have no health reasons for avoiding pregnancy, for the work of prescribing the pill or the fitting of an appliance, can be replaced by appropriate remuneration from official sources.

Secondly it is clear that we still need to do more to inform the public about the services available and to encourage them to use them. I intend to make extra funds available to the Health Education Council for this purpose and am providing money for special training courses for professional workers.

Finally, my right hon. Friends and I have concluded that there should be free contraceptive supplies for those who have a special social need and who would otherwise be unlikely to undertake effective contraception as well as for those with a financial need. We propose a new category for automatic exemption from charges for family planning supplies, that is women who have had a baby or an abortion within the previous 12 months. Apart from these, people with a medical need will pay no more than the standard prescription charge. Others will pay the full cost of their supplies.

I believe that these new arrangements will be generally welcomed. They will be implemented as soon as possible. Their cost will depend on the use which the public makes of the new services. We expect that in response to this demand the total cost for England and Wales and Scotland will build up to about £12 million per year over the next four years compared with current annual expenditure of about £4 million. This represents total additional expenditure of £20 million over the four-year period.

**APPENDIX 6**  
(see chapter 5 paragraph 442)

**TABLE 34**

**Abortions in England, Wales and Scotland, 1970**

	Abortion rate of residents per 1,000 resident women aged 15-49 <sup>1</sup>	
	Total abortions	NHS abortions
<b>England: region of residence</b>		
Newcastle	6.2	5.89
Leeds	4.5	2.74
Sheffield	4.7	2.83
East Anglia	5.6	4.13
North West Metropolitan	11.8	3.74
North East Metropolitan	6.8	3.63
South East Metropolitan	7.6	4.40
South West Metropolitan	10.3	2.62
Wessex	5.3	3.26
Oxford	6.1	3.81
South Western	6.2	4.33
Birmingham	6.5	1.78
Manchester	5.4	4.14
Liverpool	4.1	2.58
<b>Wales</b>	6.2	5.12
<b>Scotland<sup>2</sup></b>		
North	7.8	
North-East	6.3	
East	7.5	
South-East	6.6	
West	4.0	

*Source* : Office of Population Censuses and Surveys; General Register Office (Scotland).

<sup>1</sup> For Scotland the rate relates to women aged 15-44.

<sup>2</sup> There are virtually no private sector abortions in Scotland, but a number of residents in Scotland do in fact come south to England to obtain an abortion.

## APPENDIX 7

(see chapter 5 paragraph 453)

### POPULATION POLICIES: EXPERIENCE IN OTHER COUNTRIES

#### a. Policies to increase population

1. In western industrial societies policies applied in the past were designed mainly to stimulate, rather than reduce growth: 40 years ago the great fear was of underpopulation and race suicide. In Britain, the Royal Commission on Population was appointed in 1944 because of the concern expressed in the 1930s about the prospect of imminent population decline. Similar concern was felt in Sweden, France, Germany, Austria and Italy, and in some of these countries active pronatalist policies were pursued.

2. In France, Germany and Italy the policies had an important negative aspect, the prohibition of contraception coupled with repression of abortion. Indeed, in France it is only since 1967 that contraceptives, other than condoms, could legally be prescribed and sold. Sweden, on the other hand, took a radically different view. It did not wish its problem of underpopulation solved through an increase of unwanted or unplanned pregnancies and Swedish law required all pharmacies to carry a stock of contraceptive devices.

3. These negative measures were only part of the population policy of these countries. The principal measures were mainly of a fiscal nature, designed specifically to encourage families to have children. They included birth grants, family allowances, maternity benefits, marriage loans (part of which was cancelled with the birth of each child), cheap railway fares for large families, rent rebates and preferential housing allocations. In France, unlike Britain, family allowances were frankly pronatalist in character; at one stage a skilled worker in Paris with 3 children could draw the equivalent of his basic wage over again in family allowance.

4. There were two beliefs at the base of these policies. The realisation that families with larger numbers of children were at an economic disadvantage, compared with smaller families, led to a belief that the removal of these disadvantages would remove the inhibitions against increasing family size. Equally it was felt that the restriction on access to means of family limitation would make decisions to restrict family size more difficult to realise. In Sweden, where there was no restriction on the sale of contraceptives or on the dissemination of contraceptive knowledge, this was equivalent to accepting that the main motives which prevented people from having families of replacement size were economic in character.

5. Assessing the effects of policy measures of this kind presents considerable difficulties. It is impossible to separate the effects of the policy itself from the general economic and social situation of the period. In fact the postwar rise in the birth rate took place as much in countries in which pronatalist policies were in operation as in those in which there were no such policies. The prevailing opinion about prewar European pronatalist policies is that their effectiveness must be regarded as not proven.<sup>1</sup>

#### b. Policies to reduce the rate of population

6. Policies to reduce the birth rate have only been tried in Japan and in some under-

<sup>1</sup> 'The main element in French population policy is family allowances . . . but a recent survey showed that this had little influence on the number of children'. Evidence by Professor Glass to the House of Commons Select Committee on Science and Technology. *First Report on Population of the United Kingdom Session 1970-71* paragraph 772.

## Appendix 7

developed and non-industrialised countries: many of them with a poorly developed system of administration and largely illiterate rural populations. In Japan a population policy was adopted following the shock of defeat, atomic bombardment and the repatriation to the home islands of people who had settled in areas conquered by the Japanese during the previous 35 years. Consequently the experience gained in these countries is of limited value to us.

7. Knowledge and use of contraception were considerably less widely spread in these countries than in Europe. Not unnaturally attempts were first made to remedy this situation by improving the system of distributing contraceptive supplies, making them available either free of charge, or at a cost that people could afford. Improvements in the distribution of contraceptives and the dissemination of information have to be matched by an educational effort to convince those concerned of their value and utility.

8. Coupled with contraceptive propaganda there has been in many areas, particularly in Japan, a liberalisation of the law relating to abortion, especially where the existing laws were restrictive. In addition sterilisation has been used as one part of a population policy. Considerable publicity was given some little while ago to the practice in India of giving rewards such as transistor radios to men willing to undergo this operation, but the overall impact on population growth remains unknown.

9. Understandably enough fiscal measures designed to limit population growth have been relatively limited in areas in which incomes are low and direct taxation and social security benefits of little importance.

10. Again there is uncertainty relating to the effects of these policies. In Japan, fertility has fallen but the situation in which that country found herself after the war was unprecedented and it is difficult to isolate the effect of the situation as a whole from that of specific policies. There has been a decline in the birth rate of some areas in Asia, but again it is difficult to separate the specific influence of population policies on this decline. A recent Population Council publication<sup>1</sup> suggests that there is evidence of a decline in age-specific fertility rates attributable to population control programmes in Korea, Taiwan and Hong Kong, and perhaps in Singapore and Mauritius, but that no such evidence is available in 15 other under-developed countries with national family planning programmes.

---

<sup>1</sup>Studies in Family Planning Vol. 3 No. 3, March 1972.



Printed in England for Her Majesty's Stationery Office by McCorquodale (Scotland) Ltd.

Dd 260800 K 80 3/73





HER MAJESTY'S STATIONERY OFFICE

*Government Bookshops*

49 High Holborn, London WC1V 6HB  
13a Castle Street, Edinburgh EH2 3AR  
109 St Mary Street, Cardiff CF1 1JW  
Brazennose Street, Manchester M60 8AS  
50 Fairfax Street, Bristol BS1 3DE  
258 Broad Street, Birmingham B1 2HE  
80 Chichester Street, Belfast BT1 4JY

*Government publications are also available  
through booksellers*

SBN 10 152580 X